THE
ELECTRICAL REVIEW.

VOL. LXXXIII. OCTOBER 18, 1918. No. 2,134.

ELECTRICAL REVIEW.

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ELECTRIC RAILWAYS.

ALTHOUGH the existing conditions are not favourable to progress in the conversion of steam railways to electrical operation, a good deal was accomplished in the earlier years of the war both at home and abroad, and directly circumstances permit there will be great activity in this branch of engineering. We commence in this issue an account of the electrification of an important section of the Central Argentine Railway, which, like the rest of the railways in that country, was built and is owned by a British company; the section referred to is only the first instalment of a total of 100 miles that is to be converted, in order to cope with the heavy suburban traffic of the great city of Buenos Ayres—a city much larger than any in the British Empire except the metropolis itself. This is a conspicuous example of the way in which British industry should profit by British enterprise abroad; where we provide the capital for the construction of engineering works in foreign countries, it is but reasonable that we should also carry out the work. Too often in the past, however, this principle has been ignored, and great undertakings, such as those in South Africa and India with which our readers are familiar, have been financed mainly from this country, but equipped by rival manufacturing nations. In the future, we have no doubt that every effort will be made to prevent the recurrence of this procedure, which not merely deprives our workshops of employment, but also robs our designers of the invaluable experience which is to be gathered from every undertaking of the kind, and which constitutes a stepping-stone towards still greater achievements.

It is particularly desirable that no opportunity should be lost of harnessing the great water powers with which the British Empire is so richly endowed, as well as those which abound in South America and other foreign lands. We recently quoted at some length the report of the Water-Power Committee of the Conjoint Board of Scientific Societies on the resources of the British Empire; considering these in conjunction with the pressing demand for railway communication in all parts of the Empire, it will be seen that there is an immense field of activity opening before our civil, mechanical, and electrical engineering industries. The railway famine in South Africa has reached an acute stage, for it has not been possible during the war to fulfil the orders received by British firms for locomotives and rolling stock, and the rapidly developing industries of the Union urgently call for improved railway transport facilities. The alleged proposal of Mr. McAdoo to electrify the United States Railways on a gigantic scale, to which we recently referred, has directed attention in that country to the enormous potentialities of the water powers of the United States and Canada—the former estimated at no less than 60 million H.P., and the latter at about 18 million H.P. The successful electrification of

some 440 miles of the St. Paul Railroad is but a beginning; 450 miles more are to be converted on this line alone, and thousands of miles remain to be electrified. According to the *Railway Gazette*, Mr. McAdoo has recently explained that his remarks were misinterpreted; he only meant that if the railways of the United States were permanently in the hands of the Government, he would probably give the idea considerable attention. But obviously the process of conversion is already in full swing. In France great progress has been made with the electrification of the lines of the Compagnie du Midi, in the region of the Pyrenees, with the aid of water power, and the same procedure can be readily adopted in the Alpine districts. We need not labour this subject, to which we drew attention not long ago, but in closing, we must not omit to refer to an aspect of the question which is of equal importance—namely, the economic point of view. To reduce the unnecessary consumption of coal is one of the most pressing problems before the world to-day—and the electrification of railways by water power would obviously contribute enormously towards that end. Last year the United States steam railways consumed 150 million tons of coal, and the Canadian railways 9 millions. But even if the power must be supplied by steam-driven plant, the use of electric traction will save from half to two-thirds of the coal at present required by steam locomotives, which consume something like 6 lb. per H.P.-hour. The additional advantages derived in practice from the adoption of electric haulage are too well known to need recapitulation. We trust, therefore, that all concerned in the construction and equipment of railways will give the most earnest attention to this important subject, in order that no time may be lost in developing the modern system when the opportunity arises.

Methods of Trading in Canada.

Elsewhere we give a short review of the report by His Majesty's Trade Commissioner in Canada. It is satisfactory to note that an optimistic view is taken regarding the general attitude of the Canadian buyer towards the United Kingdom manufacturer. The report sets forth in some detail the conditions which the latter should strictly observe when he sets about making an earnest effort to obtain such share of the trade as it may be possible for him to obtain, in spite of the proximity of the United States competition.

So much has been written regarding the lines of goods, particularly heavy goods, which the Dominion's next-door neighbour is succeeding in selling in place of British goods, that there is little need to dwell further on this phase of the question. Prior to the entry of the United States into the war, they naturally succeeded in further strengthening their hold upon the Canadian market. It would be ungracious to our Ally to express unreserved satisfaction at the information vouchsafed in the Trade Commissioner's Report that since April, 1917, this competition had fallen off, and it would not be safe to say with any degree of confidence that this falling-off would result in Great Britain's recovering, in the face of the natural advantages of the United States as a source of supply, the position which she previously held. Certain special lines—for example, small motors, the lighter industrial machinery, particular types of electrical apparatus where some special design appeals to Dominion taste—will be saleable in the Canadian market, provided manufacturing exporters in the United Kingdom will set about their business in a practical manner.

The personal touch is the distinguishing feature of the Canadian market. If a manufacturer decides to combine forces with others who produce similar but not competitive goods, he should, after the market has been thoroughly investigated, either appoint a reliable selling agent to handle the goods of the combination, or open a branch office (a central selling agency), the expenses of which should be borne by the affiliated firms. In the case of the manufacturer whose goods are of such a character as to indicate no individual course of action on his part, he may either sell through an export agent in the United Kingdom who already has Canadian connections, or investigate the Canadian market personally.

Finally, the Commissioner still finds it necessary to advise manufacturers to make a closer study of the technicalities of the Canadian export trade—such as freights, insurance, exchange, packing, preferential Customs duties, terms, and credits.

Unions at Issue.

Our readers will have observed with regret, which we share, that the hostility displayed towards the Electrical Power Engineers' Association by the leaders of the London Committee of the Electrical Trades Union continues unabated; it is very unfortunate that their differences cannot be reconciled and their animosity dispelled—there is ample room for both organisations to exist side by side in harmonious co-operation. We fear, however, that this happy consummation can hardly be hoped for, so long as the E.T.U. in London remains under the control of the existing leadership; the attitude evinced by the London district secretary, Mr. W. J. Webb, in the letter which we published in our last issue, is compatible only with war *à outrance*, and the form of words with which he threatens to deprive his "brother" of his livelihood, as the penalty for the exercise of his free will, is a ghastly mockery of the principle of fraternity which the writer affects to uphold.

On this question there cannot be two opinions. It is the undoubted and immemorial right of a British citizen to go his own way without interference, provided that he does nothing to his neighbour's detriment, and complies with the regulations laid down by the State. To controvert this fact is to rebel against the most fundamental principle of citizenship, and to substitute tyranny for liberty—the most precious possession of an Englishman. Those who deny this right to their fellow-citizens would be amongst the first to assert it were their own privileges assailed. The threat of the E.T.U. Secretary, therefore, is utterly indefensible and unworthy of a free man, and will do far more harm to his own cause than to that of the E.P.E.A. We do not believe for a moment that the members of the Union approve of the policy which is put forward in their name—but, unfortunately, irresponsible leadership is the curse of Trade Unionism, which in itself is an indispensable and beneficial institution.

Is it not possible for representatives of the two societies to meet and talk over the situation, with a view to arriving at a friendly settlement of the questions at issue? We are sure that each side would find the other far less unreasonable than it had appeared to be, so long as the discussion had been carried on at long range; the members of both parties are of the same race and in the same industry, their personal interests do not clash with one another, and there is no insuperable obstacle in the way of their arriving at a good understanding. Continued strife will benefit no one.

We have received from a North Country member of the E.T.U. a letter which, unfortunately, makes an unmerited personal attack upon an honourable and patriotic engineer, and therefore will not be published in our columns.

Apprentices in the Army.

One of the most difficult of the many industrial questions that will have to be solved when demobilisation commences is that of the position of apprentices who joined the Forces before their training was completed. Many of these have been with the Colours for three or four years, and will come back as full-grown men, who cannot be expected to resume their training at a nominal wage, while they will not be qualified to rank as journeymen and draw the wages of skilled artisans. To allow these men to become unskilled labourers would be a gross injustice. They have fought our battles, and are entitled to be restored at least to the positions that they would have occupied had they remained at work. The problem, therefore, is how to provide them with the training which is their right. Much may be done towards this end by individual employers; but the matter is really one which concerns the State, and it should receive the earnest attention of the Minister of Labour.

ELECTRIC TRACTION ON THE CENTRAL ARGENTINE RAILWAY.

The Central Argentine Railway, with a present mileage of 3,300 miles, serves the northern portion of the Argentine between Tucuman, Cordoba, and Rio Quarto on the west and Santa Fé, Rosario, and Buenos Ayres on the River Plate. The number of passengers carried on the system during the 12 months ending June, 1914, was 23 millions, of whom 16 millions were carried on the three sections which serve the north-western suburbs of Buenos Ayres. The explanation of the large ratio which the suburban traffic bears to the total traffic is found in the fact that Buenos Ayres, with a population of over one and a half millions, contains more than one-fifth of the whole population of Argentina. The city handles more than half in value of

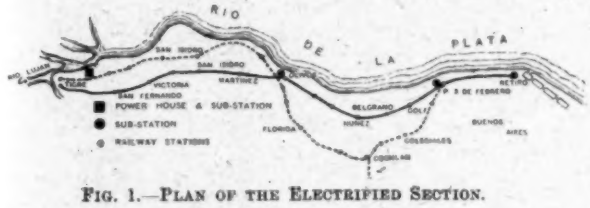


Fig. 1.—Plan of the Electrified Section.

the total imports and exports of the country, and new docks are under construction which will increase the capacity of the port by more than 50 per cent.; all the great railways, British engineered and British owned, converge towards it; it is the centre of government, and its climate is good. During the last 20 years its growth has been at the average rate of 7½ per cent. per annum, and there is every reason to believe that this rate will be maintained.

Realising the importance of dealing economically with the development of their suburban traffic, the directors of the Central Argentine Railway decided to electrify the suburban sections, and the work was put into the hands of Messrs. Merz and McLellan, who were instructed to act in co-operation with the consulting engineers of the company, Messrs. Livesey, Son & Henderson, the two firms being jointly responsible for the design and supervision of the whole equipment.

On August 24th, 1916, the President of the Republic, Dr. Victorino de la Plaza, inaugurated electric traction on the line from Retiro Terminus, in Buenos Ayres, to Tigre on Las Conchas River, *viâ* Victoria. The Central Argentine Railway thus had the distinction of being the first of the great railway lines in the Argentine to adopt the modern method of dealing with suburban traffic.

The service on the branch has operated with marked success not only from the engineering, but also from the traffic, point of view, the passenger journeys in the first six months of the year 1917 being some 11 per cent. in excess of the figures for the corresponding period of 1916.

The complete electrification works for the suburban system include a power station of 15,000 kw. capacity, 57 miles of high-tension transmission cables, four traction sub-stations with 14,000 kw. of converting plant, and the electrical equipment of 100 miles of single track. Power is produced in the generating station as three-phase current at 20,000 volts, with a periodicity of 25 cycles, which is transmitted to the sub-stations, converted to direct current at 800 volts, and supplied to the trains through a third rail. The suburban route of the Central Argentine Railway already electrified is shown in fig. 1, with the location of the power station and existing sub-stations.

The whole of the apparatus used in connection with the electrification was manufactured in Great Britain, and the principal contracts covered the erection of their plant by the various contractors; they are set out as follows:—

Power station buildings and complete boiler house equipment.	Babcock & Wilcox, Ltd.
Turbo-alternators, transformers, and motors.	C. A. Parsons & Co., Ltd.
Condensing plant and pumps ...	British Westinghouse Electric and Manufacturing Co., Ltd.
Switchgear in power station, auxiliary motors, &c.	British Thomson-Houston Co., Ltd.
High-tension transmission and low-tension track cables.	W. T. Henley's Telegraph Works, Ltd.
Structural steel work for power station entrance way, test room, offices, and sub-stations; also the cranes for the sub-stations.	David Rowell & Co., Ltd.
Electrical equipment of sub-stations.	Brit. Thomson-Houston Co., Ltd.
Rolling stock—bodies, underframes, and bogies.	Metropolitan Carriage, Wagon, and Finance Co., Ltd.; Birmingham Carriage and Wagon Co., Ltd.
Ditto, Electrical equipment ...	Brit. Thomson-Houston Co., Ltd.

The provision of the foundations for the power station and sub-stations, the walling of the sub-stations, excavation for cables, and the erection of the third rail were carried out by the railway company with its own staff.

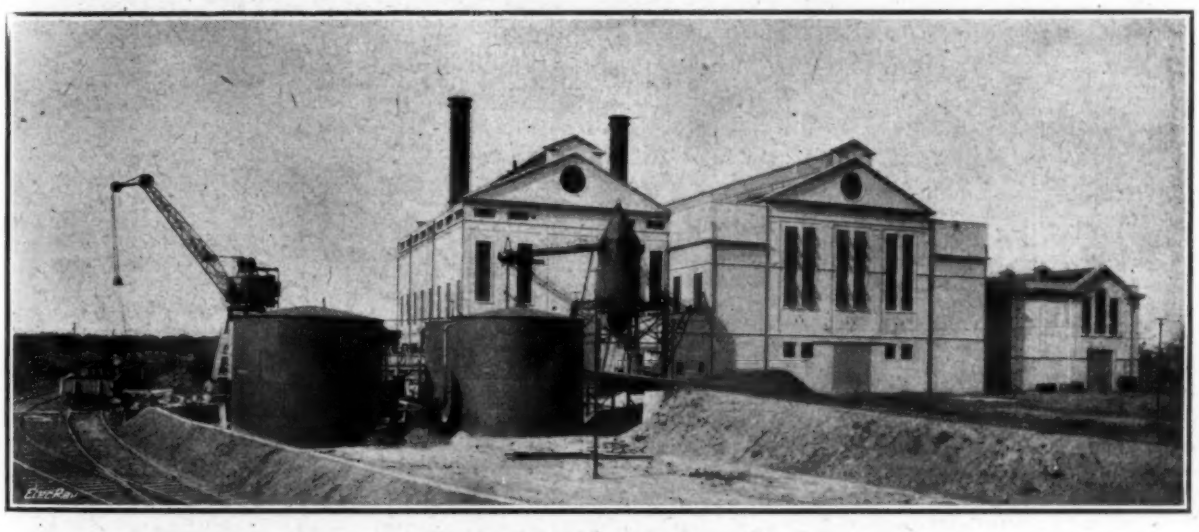


Fig. 2.—The Power House and Coal Yard.

The power house (fig. 2) has been placed at the station of Canal San Fernando. The site was swampy, and, in order to make a sound foundation, some 3,000 ferro-concrete piles were driven down 33 ft. till they reached the hard clay (tosca), which is found at varying depths all around Buenos Ayres. On the top of the piles a concrete raft, 2 ft. 6 in. thick, reinforced with old rails, was formed, in which pipes were laid for the cables.

The engine room and boiler house are arranged parallel to each other, with coal and ash-handling sidings behind the latter. In front of the engine room are a rotary

converter sub-station, laboratory, and offices. A fitting shop and workmen's accommodation are provided at the permanent end of the engine room. There is space on the site to double the capacity of the station by extending the buildings towards the river.

The buildings are steel-framed structures, panelled with armoured concrete and finished with a white cement. The roofs of the sub-station and offices are of concrete; that of the boiler house is of corrugated iron. The engine-room roof consists of a wood ceiling covered with waterproof felt and with corrugated iron on top; this construction was required to avoid the condensation of moisture from hot humid air striking a cold corrugated iron roof.

Particulars of the principal plant in the boiler house are as follows:—

Number and type of boilers ...	Six Babcock & Wilcox marine-type water tube boilers.
Normal evaporation of each boiler	20,000 lb. of water per hour.
Working steam pressure and temperature	210 lb. per sq. in.; 600° F.
Heating surface of each boiler...	4,170 sq. ft.
Grate area of each boiler ...	98 sq. ft.
Type of stokers	Underfeed.
Type and size of economisers ...	Green; 200 pipes in each.
Number of fans	Eight "Sirocco" fans.
Number and type of feed pumps	Two impulse turbine-driven centrifugal pumps. Two vertical reciprocating, Nichols type.

Capacity of each feed pump, 75,000 lb. per hour.

fuel consumption figures for a recent week are:—Coal, 72·5 tons; oil, 15·5 tons; wood, 690·0 tons.

The wood burnt is red and white quebracho and algarroba, and the relative values of the different fuels are, roughly, as follows:—1 lb. of coal (calorific value 15,000 B.TH.U.) is equivalent to 0·8 lb. of oil, 2·5 lb. of red quebracho, 3·3 lb. of white quebracho, or 3·3 lb. of algarroba.

Labour and transport difficulties have become very acute recently, and the supplies of oil and wood have become so precarious that experiments have been made in burning maize. The results obtained indicate that maize is a slightly better fuel than red quebracho.

The combined efficiency of the boilers and economisers works out at about 85 per cent. when Welsh coal is being burnt.

The feed-pumps draw their supply from hot-well tanks in the pump house, and make-up water comes from a storage reservoir constructed alongside of the power station to two storage tanks erected above the hot-wells. Water is pumped from the River Lujan through a 6-in. pipe to the reservoir, and is there treated with alumino-ferric to precipitate the sediment which the river water contains.

The steam piping consists of a range of solid-drawn pipes, the flanges, of forged steel, being riveted in the case of pipes of 7-in. diameter and over, and screwed in the case of smaller pipes. The blow-off piping is solid-drawn steel, and connects to a blow-off sump formed of a boiler drum. The exhaust and escape-steam piping is lap-welded.

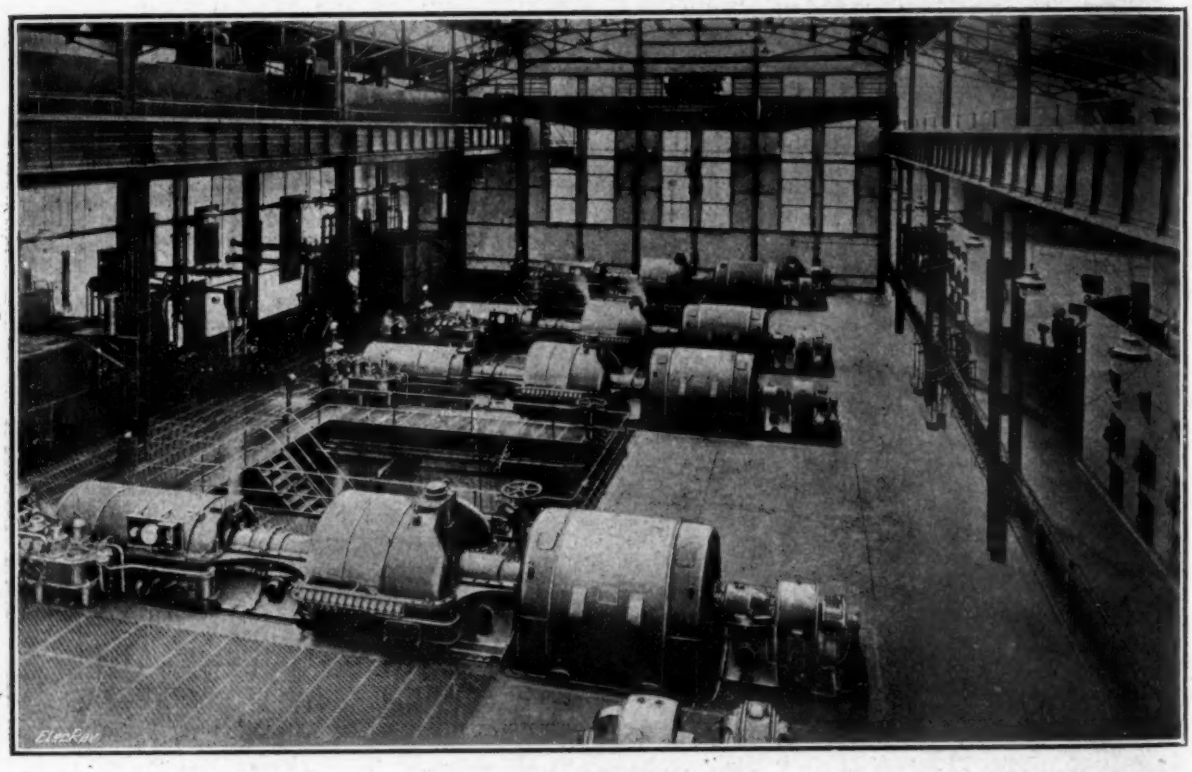


Fig. 3.—Interior of Engine-Room.

The boilers are arranged four a side, grouped in pairs, each boiler having its own superheater and economiser. One steel chimney with an induced-draught fan serves each pair of boilers, and forced draught is supplied to the furnaces by four fans in the basement.

The furnaces are lined with Glenboig bricks, and are suitable for burning either Welsh or Durham coal. The stokers are of the underfeed type, operated by steam rams. In anticipation of a shortage of coal, two of the boilers were arranged for oil firing, and a complete equipment of the Wallsend-Howden system has been put into operation, with storage tanks, filters, and pumps. As the shortage of both coal and oil, due to war conditions, became more acute, other boilers were adapted for wood firing, and the

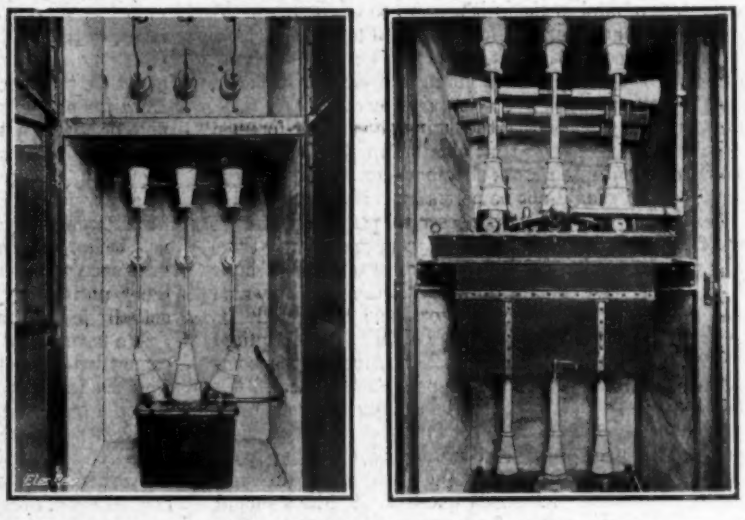
The storage and handling of coal is provided for by means of an elevated railway track running alongside of the boiler house at firing-floor level, a gantry parallel to the buildings and carrying a level-luffing jib crane with a grab of 2 tons capacity, and two sidings at ground level. The coal trucks are brought on the site from the main line at Canal San Fernando Station, and the coal can be grabbed from them and either filled direct into two 15-ton receiving hoppers or into bottom discharge wagons which can be hauled along the elevated siding by a winch till they come over the receiving hoppers; thence the coal passes through crushers to gravity-bucket conveyors. These elevate it to a tray conveyor which takes it to coal bunkers above and between the two ranges of boilers. The coal bunkers have

a capacity of 1,000 tons; they are built of mild steel plates lined with armoured cement, and the bottoms are "V" shape in section. Alternatively, the arriving trucks can be pushed direct up the 1 in 25 incline to the elevated siding and the fuel—coal or wood—can be discharged direct on the firing floor by hand. The stock coal is grabbed from the trucks and stored below and around the gantry in a coal deposit floored with sleepers and constructed within range of the jib crane, which can plumb to a radius of 50 ft. The capacity of the store is 10,000 tons. The ash-handling arrangements comprise a suction ash plant with two 38-H.P. exhausters, which take the ashes from the furnace ashpits through electrically-operated crushers and specially heavy cast-iron pipes to a mild steel ash bunker of 80 tons capacity, lined internally with armoured concrete. The bunker is erected at the end of the boiler house at such a height that railway trucks can pass underneath to receive and remove the ashes. Alternatively, the ashes can be taken from the ash-pits by half-ton wagons along rail tracks laid along each side of the boiler-house basement, and deposited outside on the site.

Fig. 4.—Part of the Main Switchboard.

The generating plant is so arranged that provided one boiler is steaming, any one of the turbo-alternators can be started up and can give a supply to the main bus-bars and to all the station auxiliaries. In addition, the break-down of anything comprised in one generating set will not prevent the operation of the remaining sets. There are four turbines in the engine room (fig. 3); each has its own steam-driven oil pump for use when starting up, its own condenser with air and water extraction pumps, and an independent circulating water pump. On the electrical side it has a self-excited exciter direct-coupled to the alternator shaft; leads from the alternator run direct to the "unit" transformer, which steps down the generated voltage from 2,500 to 440 volts, and gives a supply to the unit distribution board. From this board are fed the motors which operate the auxiliaries definitely belonging to the generating set to which it is attached, viz., those driving the air pump, exhaust valve, step-up transformer oil pump, and circulating water pump. The other station auxiliaries which are common to the whole station, *e.g.*, economiser and fan motors, are fed from a station distribution board divided into four sections, each of which can be isolated at will and fed from one of the unit boards, the feeders to the auxiliaries being so distributed among the sections that failure of one section will not put out of operation all the individual pieces of any auxiliary gear. The main leads from the alternator (1 sq. in. single-core cable) run to a step-up transformer, housed in the same compartment as the unit transformer, which raises the generated voltage from 2,500 to 20,000 volts, at which pressure the power is supplied to the station bus-bars. The station equipment, as a whole, is divided into two independent parts, either capable of running without the other. The main bus-bars are divided in the middle by a bus-bar sectioning switch; two generators feed each half, and from each half a supply is given to a "station" transformer. Either of these station transformers can feed the station distribution board, the four sections of which are normally run coupled up. Connected to the extreme sections of the station distribution board are two motor-generators giving a supply for lighting the station and for charging the two batteries, which form a duplicate source of power for the tripping coils on the switches and the indicating lamps on the switchboard. The main outgoing feeders are distributed between the bus-bar sections, so that failure of one section will not shut down any sub-station.

The engine room contains four Parsons turbines with high and low-pressure cylinders, running at 1,500 R.P.M., and coupled to generators each giving 3,000 KW. at the most economical load, 3,750 KW. at maximum continuous load, and 5,500 KW. momentarily; the condensers were made by the British Westinghouse Co., and have each a cooling surface of 8,250 sq. ft., dealing with 45,000 lb. of steam per hour with 6,800 gallons of cooling water per minute at a temperature of 80° F. The air and water extraction pumps are of the Westinghouse-Leblanc type, direct-driven by 40-H.P. motors at 1,440 R.P.M., and the four circulating-water pumps are of the Gwynne vertical rotary type, driven by Westinghouse motors of 240 H.P. at 720 R.P.M., and each delivering 6,800 gallons of water per minute. Similar pumps are provided for the purified water, bilge, and emergency pumps, and Gwynne air pumps for the air exhausters.



Figs. 5 and 6.—Switchgear Cubicles, Containing Potential Transformer and Oil Switch.

A 40-ton crane, with a 5-ton auxiliary hoist, of 60-ft. span, was supplied by Messrs. Babcock & Wilcox, Ltd.

(To be continued.)

D

THE DUTIES OF THE PROGRESS DEPARTMENT.

By W. J. HISCOX.

(*Concluded from page* 358.)

THE FITTING AND ERECTING SHOPS—THE TESTING DEPARTMENT—THE DISPATCH DEPARTMENT.

(*m*) *The Fitting and Erecting Shops.*—The term "Fitting Shop" is here intended to denote the department responsible for the fitting and assembling of the various sub-sections of the unit, just prior to the final erecting stage, and it is, therefore, necessary for the details required in connection with the sub-sections to receive priority at the hands of the preceding departments, a fact which must not be lost sight of by either the progress man or the departmental progress chaser. It is usual for the Progress Department, when compiling the delivery programme, to give a separate date for the completion of the sub-sections, apart from the date given for the delivery of the erected unit, even when the fitting and the erection shops are run in conjunction, under one head, as this ensures priority of treatment being meted out to those details which are required in connection with the first-named department.

In a well-organised factory, all details, no matter from whence they come, must be received in the fitting-shop component store before being issued to the fitters, this also applying to those parts which require an intermediate fitting operation prior to the final machining. This is the only way by which an accurate record of the whole of the details received can be kept, and it also simplifies the work of the fitting-shop foreman, seeing that, under this system, there is only one place from which he can draw the whole of his supplies.

This component store, like every other departmental component store in the factory, should be under the control of the Progress Department, instead of being controlled by the departmental foreman, the storekeeper working in conjunction with the progress chaser. The reason for this is obvious, since if this store is subservient to the authority of the departmental foreman, the component parts, upon arrival, immediately become the property of that department, and can be drawn upon indiscriminately, regardless alike of the requirements of specific orders, and the necessity for accurate record-keeping. Under such circumstances, a chaotic state of affairs exists with regard to the department's commitments, and it is, therefore, essential that the store be quite independent of departmental influence, so that all details may be issued to the fitters in the correct sequence, and every item recorded in a systematic manner.

It frequently happens that the fitting-shop under-foremen spend a great deal of their time chasing up details required in connection with the work they have in hand. This is regrettable, and should not be necessary. Neither should it be necessary for the progress chaser to personally interest himself in the fitting shop except in connection with those details which require further machining operations after fitting. The chaser should work to get the parts in which he is interested to the component store, and this should be done in such a manner as will ensure all the details required in connection with a specific sub-section being in the component store in accordance with the programme date.

The storekeeper should keep a correct record of all parts received, and issue the same to the fitting section concerned, upon demand, or advise the section foreman immediately all the details required in connection with a certain sub-section are available. All goods issued to the fitters should be signed for by the section foreman, and no detail should be issued in excess of the quantity covered by the specification list. It sometimes happens that a component part is scrapped in the fitting shop, and the section foreman, knowing that further quantities of the same article are available in the component store (in reserve for other orders), will demand a replacement. Such a demand should not be acceded to unless accompanied by a copy of the inspector's reject note, which, upon being presented, would be duly recorded by the storekeeper, and then sent for the Progress Department to be dealt with, and, under such circumstances the rejected article could be replaced from the available stock.

In factories where the fitting and erecting departments are run as separate concerns, the various sub-sections, when completed, would be sent to the erecting shop store, to be recorded and stored until required in connection with the final erecting, but where the two departments are under one head, the foreman would be responsible for all the sub-sections being completed to ensure the erected unit being completed at the appointed time.

The interest of the progress man with regard to the fitting and erecting departments is centred in the component store, as the records kept there will advise him as to the necessity of exerting pressure in any particular direction, and it is obvious, therefore, that too much attention cannot be given to ensure the strict accuracy of these records, upon which so much depends. The storekeeper must be a live man, not merely content to receive and issue parts, but to keep in close touch with the progress men and the chasers, and promptly advise them when any shortage of material threatens to delay the completion of any sub-section or unit.

(*n*) *The Testing Department.*—The completed unit, duly inspected, passes from the erecting shop to the test, which department has also been given a date for completion. The tests, of course, vary in connection with different lines of manufacture, but the progress man should be sufficiently conversant with the special requirements of the line of manufacture under his control, to be able to estimate fairly accurately the time necessary to perform this important operation. As many types of apparatus pass through the testing department, the progress man must keep in close touch with this department, to ensure that no unnecessary delay occurs with regard to the unit in which he is interested.

In the event of a unit failing on test, necessitating its return to the Erecting Shop, a fault sheet or other record accompanies it, and a copy of this should be sent to the Progress Department. The progress man interested would thereupon get in touch with the Erecting Shop and the other departments concerned, and, if necessary, issue a revised completion date to each of the departments handling any part of the returned unit, all work of this description being put on a preferential basis, with a view to minimising delay in connection with the dispatch of the article in question.

(*o*) *The Dispatch Department.*—When the completed unit has successfully passed the test, the Testing Department, or the official responsible for the final inspection, will enumerate the necessary particulars upon a shipping note, and this, together with the unit, will pass to the Dispatch Department. Here the unit will be packed, the dispatch note or advice note made out, and the unit then forwarded to its destination, the date upon which it leaves the factory coinciding with the final date appearing on the programme. The Dispatch Department should notify the Progress Department in good time should the shipping instructions not be to hand, and it should be understood that the progress man's responsibility does not cease with regard to the order until every item in connection with the same has actually left the factory.

We have traced in this article the Progress Department's connection with the departments handling a specific order, from the instructional to the dispatch, and it will be seen that the progress man's assistance at every stage is a vital necessity to ensure a speedy delivery. The article has, of course, been written from a progress point of view, and departmental systems and practices have not been commented upon, except so far as they affect actively the mode of procedure suggested. Although, for the purposes of this article, to prevent multiplicity of detail only the main departments, representing distinct phases of work in progress, are commented upon, the policy advocated can be extended to all intermediate departments, such as the Winding Department, special Machining and Fitting Departments, &c., by means of the delivery date system, the article being inspired for the express purpose of setting forth the duties of the Progress Department in connection with the various departments concerned in the execution of the order.

THE ELECTRICAL EQUIPMENT OF KEADBY BRIDGE.

A bridge over the Trent at Keadby, 14 miles north of Gainsborough, on the Great Central Railway, was opened in May, 1916. This bridge, of more than ordinary interest, forms part of an elaborate deviation and widening scheme, is known technically as a "combined railway and highway Scherzer rolling-lift bridge," and has replaced the old swing bridge which carried the railway for nearly 60 years, whilst it also bears a public highway. Its most remarkable feature is the opening span, which weighs over 2,900 tons, and is the largest in Great Britain, if not in the world.

When the question of the improvement of the railway line first came under consideration there was a strong desire that the span of the new bridge should be very much greater than that of the old structure, and that ample facilities for traffic across the river should be provided. The Scherzer system recommended itself not only as a complete structure entirely suitable to the special needs of the situation, but for the ease with which it could be built without interference with the traffic on the Trent.

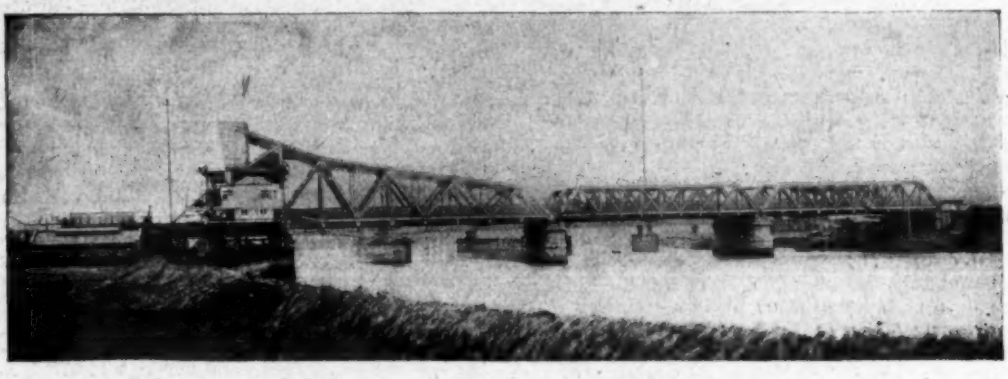


Fig. 1.—General View of the Keadby Bridge.

The old swing bridge provided two navigable channels, each 60 feet in width, whereas the lifting span of the new bridge gives a clear waterway 150 feet wide, equal to the two openings of the old bridge, including the central dolphin and piers. The roller-lift principle enabled the constructional steelwork of the opening span to be built in a vertical position, leaving the river between the abutment and the pier in the river free for the passage of river craft.

The provision of a public roadway, parallel to the railway, together with new road approaches on both sides of the river, constitutes an inestimable advantage to the public. The old bridge was a railway bridge pure and simple, and there were no facilities for the crossing of the river within a distance of 15 miles.

The new bridge, as shown in figs. 1 and 2, consists of five spans of the following dimensions: Two fixed river spans of 135 feet each; a lifting span of 160 feet, giving, as already mentioned, a clear waterway of 150 feet; a track span of 40 feet on which the lifting span rolls; and an approach span of 70 feet on the east bank of the river. The bridge has a width of 53 ft. 6 in. between the centres of the outside girders, of which 29 ft. 3 in. is occupied by the railway and 24 ft. 3 in. by the roadway. Each span consists of three main girders, the central one dividing the roadway from the railway.

The three main girders of the track span form a path on which the lifting span rolls, and together have to sustain the weight of the lifting span. The lifting span consists of three main trusses spaced at the same distance apart as the main girders in the fixed spans, and is counterweighted at the rear end in order to secure balance at all angles of lift. The counterweight consists of a rectangular steel shell extending across the full width of the bridge, and is heavily braced internally by lattice frames and strengthening girders. Its internal capacity is 24,780 cb. ft., and it contains 1,800 tons of concrete.

On either side of the lifting span heavy frames are built up alongside of the track girders and anchored down to the supporting piers of the bridge. At their upper extremity these frames carry horizontal girders, to which are bolted the main operating tracks. The clearance between these frames allows the span to move freely as the bridge is raised or lowered.

The position of the racks coincides with the centre of the rolling circle of which the segmental girders form part, and the rotation of the pinions attached to the gudgeon pins of the moving leaf, as they travel horizontally along the racks, rolls the leaf backwards or forwards, so opening or closing the bridge. A horizontal platform at the level of the fixed racks is constructed on the leaf itself, and on this platform the lifting machinery is accommodated.

Owing to the absence of power in the neighbourhood, a special plant for the generation of electricity was installed consisting of two 70-b.h.p. 4-cylinder petrol engines, running at 700 r.p.m., and direct-coupled to two B.T.H. direct-current 6-pole shunt wound generators of 50-kw. capacity at 220 volts. A storage battery of 128 cells is provided, capable of supplying the motors with current for about 30 operations of the bridge before recharging is necessary. The arrangement of the generating plant and switchboard is shown in fig. 3.

The whole of the operations involved in the lifting and lowering of the moving leaf are normally controlled by electrical equipment designed and installed by the British Thomson-Houston Co., Ltd., of Rugby.

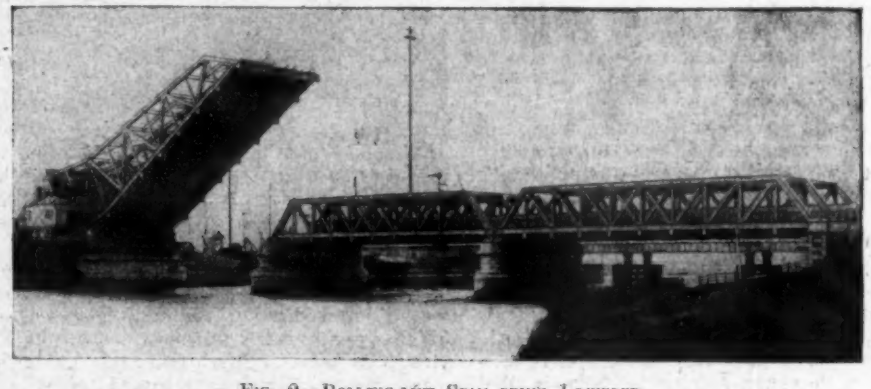


Fig. 2.—Rolling-lift Span being Lowered.

The moving leaf is worked by means of two direct-current 115-h.p. 220-volt motors, having a normal full-load speed of 380 r.p.m. and an overload capacity of 100 per cent. These motors are compound wound with shunt starting fields, and are carried on the leaf itself; they are coupled back to back, and arranged so as to work either singly or in parallel.

The method of control is such that by operating suitable switches either of the two motors can be used independently of the other, and all safeguards apply to either arrangement; thus in the event of the breakdown of one machine it is

possible to use the other under all but the most abnormal conditions.

The driving power is transmitted through independent trains of gearing to the main pinions on each side of the moving leaf. The angle of maximum elevation of the bridge when fully open is 81 deg. 51 min., and the time taken to open or close it electrically is less than two minutes.

Owing to the very exacting weather conditions to be met, and to the fact that it is essential to interlock the railway signal system with the operating gear for the bridge leaf, the control gear is somewhat complicated. In a bridge of this description it is essential that the interlocking arrangements shall obviate all possibility of either rail or road traffic using the bridge in any position but completely down. Further, it is essential that all safety devices shall be operated in such

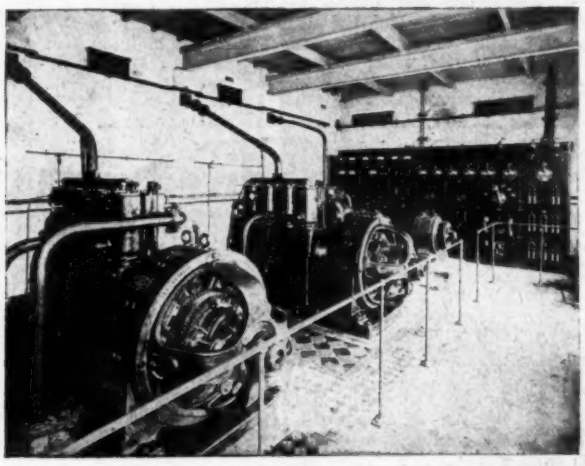


Fig. 3.—Interior of Power House, showing B.T.H. Generators and Switchgear.

a manner that they act automatically in the event of failure of the power supply.

Arrangements are made so that when a circuit breaker opens, either in the operating cabin or in the main machinery house, all brakes are applied automatically.

The conditions to be met in the actual operation of the bridge leaf itself are very stringent. The leaf must be under the full control of the operator at all times, and under all wind conditions, and it must be possible for an unskilled operator to open or close the bridge without causing damage. The system of control adopted enables these conditions to be met quite easily in spite of the great mass of the moving elements.

The method of control adopted when lowering the bridge comprises series resistance control for the greater portion of the travel, and diverter control, with limited power, for the last few feet of the travel. For this purpose limit switches are arranged in such a manner that at a pre-determined angle of the bridge when lowering, certain contactors are opened, thereby inserting series resistance in the armature circuit of the driving motors, while at the same time a diverter circuit is made to give a positive slow speed, practically independent of the load on the machines. At a slightly later period of the travel another limit switch operates, cutting off power entirely, and causing the bridge to stop a few feet above the ground level. The operator can then, by means of a special pedal switch equipment, inch the bridge down under diverter control with a limited amount of power; the provision of an oil buffer ensures that the leaf can be brought to the fully closed position without a perceptible jar. Further provision is made so that, by moving the controller handle at the same time as operating the pedal, it is possible to vary the amount of braking effect given by a special motor-operated brake, thus giving a variation in speed corresponding to the limited power already mentioned.

The braking arrangements are very complete, and comprise two sets of brakes operated by a direct-current, 1-h.p., 220-volt, series-wound motor, and two sets of solenoid brakes operating on drums geared to the driving motor shafts. All brakes are arranged to set automatically in the event of voltage failure, irrespective of the position of the controller handle.

The method of control for raising the bridge is similar to that already described for lowering, except that no diverter control is provided; this is unnecessary, as the bridge is not usually opened to the full extent of its lift, and consequently the amount of over-run allowed is much in excess of that actually required.

There is one important factor in connection with the lifting, however, which has to be taken care of, namely, the effect of wind pressure. Under certain conditions a strong wind will actually run the bridge backwards, and special limit switches are arranged so that when this happens all brakes are applied when the bridge reaches a predetermined angle. This safeguard also comes into operation when starting to lower the bridge from the fully open position. This is essential, as under certain conditions a strong wind may take control and run the bridge backwards when the brakes are released, and before power is applied.

The contactor equipment for the control of the bridge movements is located in the machinery house. It consists of a panel for each separate motor, containing the various line and resistance contactors, overload relay, isolating main switch, and fuses. This panel is controlled by a special controller comprising two parts, the first operating the contactor gear which makes the connections for raising and lowering the bridge, and the second varying the amount of resistance in series with the motor operating the brakes. Thus, by moving the controller handle, it is possible first to free the solenoid brakes, and then to vary the effect of the motor brakes from maximum near the off position to zero when the first power position is reached. A coasting point is provided between the last braking position and the first power notch so that, if desired, wind pressure can be used to lift the bridge, the motor and solenoid brakes being brought into action when it is desired to stop.

With the controller is incorporated a special locking magnet, operated from the signal circuits, which ensures that the controller handle cannot be moved to open the bridge until the signals are set to "danger." Further, the signals cannot be set clear until the bridge is in the fully closed position. A special motor is used in connection with the locking bolts between the rails on the moving leaf and those on the fixed span. These rails are locked in the down position by means of steel bolts controlled from the signal cabin. The bridge itself is locked in the down position by two heavy forged steel bolts worked electrically by means of a direct-current, 1½-h.p., 110-volt, series-wound motor operated from the control cabin. These steel bolts engage with castings anchored to the pier, and arrangements are made so that it is impossible to operate the contactors for lifting until these bolts are withdrawn; the bolts cannot be closed when lowering until the bridge is right down and control has been cut off from the contactor panel.

Provision is made for reversing the motors by means of a special reverser situated on the moving leaf, and the special limit switches referred to in the foregoing description are operated by means of sprocket gearing which is driven from the main motor shaft. These limit switches are situated in the machinery house on the moving leaf.

Electrically operated gates, opened and shut by a direct-current, 4½-h.p., 220-volt, compound-wound motor, are provided for the protection of the railway traffic. These gates

Fig. 4.—Operator's Cabin, showing Master Controller in Background.

are interlocked with the railway signals which, in turn, are interlocked with the control gear on the bridge.

This bridge was built to the designs, and under the supervision, of Mr. J. B. Ball, M.I.C.E., chief engineer of the Great Central Railway, by Sir Wm. Arrol & Co., Ltd., of Glasgow; the electrical equipment was supplied by the British Thomson-Houston Co., Ltd., of Rugby.

The "Key" Industries Exhibition.—At the request of the Board of Trade, the New British and "Key" Industries Exhibition, Central Hall, Westminster, S.W., will remain open until October 24th, to enable the Greek Minister of Agriculture and the influential party representing Greek commercial interests, which is now touring the leading industrial centres of the United Kingdom, to pay a visit to the Exhibition.

Mr. W. M. Hughes, Prime Minister of Australia, was to deliver an address at the Exhibition on Wednesday last.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

"Fraternity"—or Tyranny?

I have read with amazement the letter sent to a proposed member of the E.P.E.A. by Mr. Webb, London Secretary of the E.T.U., and for undiluted impudence this letter takes some beating.

Is Mr. Webb aware that in his acting capacity as secretary he is actually the servant of the members of his union? and for a servant, honorary or paid, to write insulting letters of this type is, in my opinion, degrading the prestige of the union to a level lower than that of the gutter.

I do not know the exact purposes and aims of the E.P.E.A., but I do know that if engineers, whether members of the E.T.U. or not, like to join and maintain another association they are free to do so, in spite of the lordly overbearing manner of Mr. Webb, who, I take it, is responsible to his members for his utterances.

I thank heaven I am not a member of the E.T.U., nor would I associate myself with it, but there is no more ardent trade unionist than myself if a union is properly conducted, and in view of the amount of unenviable notice the E.T.U. has brought upon itself at different times, it is time the members got a new administration or the whole thing was disbanded, for the mightiest motto for a trade union should be the free use of one's personal inclinations, at least as far as voluntary membership is concerned, and after all, is the loss of one member of such moment to Mr. Webb that he must needs threaten to deprive a fellow being of his living? where does the E.T.U. get its power from, weird hallucinations of its executive?

However, I have never been in sympathy with the union at all, mainly on account of its administration, and if the news is of value to Mr. Webb I do not employ E.T.U. men, and would not, although I pay their rates, and if he thinks my staff any the less skilled he is talking "through his hat."

In conclusion, I have brought the matter before the editor of *John Bull*, and I sincerely hope that it will get wide publicity.

J. Shaw.

Glasgow, *October 12th*, 1918.

Technical Publicity.

I am sure many of your readers must have read your leading article "Sales Promotion" and Mr. Birkett's "Technical Publicity," both of which appear in your current issue, with considerable interest. One is complementary to the other, each bearing on the vital subject of commercial expansion. I am glad to see that both writers emphasise the importance of "quality" (or what for want of a better term I call dignified distinction) in catalogues and in Press advertisements. The value of this should be obvious. No good business man would employ a shabby representative. He would insist on his travellers being well groomed and well educated, in fact he would require men of breeding, with experience requisite to their calling.

As the advertisement is a salesman, albeit a silent one, though not less efficient on that account, there is every reason why it should be suitably garbed, the dress in this case being the way in which it is displayed. Appropriate display is a form of layout which will give distinction to the advertisement and cause it to attract the reader's attention by its dignified and arresting appearance, a feature which may be due to its well-considered originality—and by the interesting information conveyed by the text.

The creation of advertisements of this order is not, and cannot be, the work of the amateur. It requires the experience of a person who has made a special study of modern advertising, and in the case of technical publicity, a practical knowledge of engineering.

It is the firm which gives its advertising the consideration it deserves, and which uses the best in the way of copy and display, which reaps the maximum benefit from its expenditure. As long as advertisers treat their advertising as of little account, and delegate the writing of the copy and the designing of the display to any member of the staff who likes to try his hand at it, they get indifferent results.

Advertisement designing is a highly specialised business, a craft demanding experience. Some seem to look upon it as the boy did who was asked if he could play the fiddle, "I've never tried," he said.

In passing his strictures upon American advertising, surely Mr. Birkett does not include the American technical Press. Let anyone glance through the publicity sections of the motoring papers, the engineering journals, or the *Saturday Evening Post* pages devoted to mechanical or electrical appliances, and he will be impressed by the way in which these advertisements are set out. Not for one moment do I suggest that the wording is of a type to be adopted in this country. It is far too racy; too breezy altogether. At the same time, it is the style of language which Americans use in ordinary conversation and understand. In their case it is appropriate. With us a quieter and more sober form is current. It is the skilled writer who drafts his "copy" in the style which will appeal to and interest his particular class of reader.

In the past few years the advertising pages of our engineering journals have shown that many firms are employing qualified assistance in the preparation of their announcements, and in the immediate future many more will follow suit. And it will pay them handsomely.

Too many look upon an advertisement as a means of keeping their name before the public, nothing more. They write their names and addresses large, give a list of apparatus they sell, but leave out the one thing of vital importance, and this is information about the goods. They assume that engineers know every type of machine and appliance made, which is a mistake. Take the average central station engineer as an example. He has had two or three makes of engines under his control, not more than two types of turbines, rarely more than two styles of boiler plant, the same with electrical equipment and switchgear. How *can* he know every kind? It is impossible. It is your advertisement which must tell him the advantages of *your* apparatus. Interest him in your specialities, then he will get in touch with you, and your representative can do the rest.

Believe me, engineers do read advertisements. Only the other week I was asked by an engineer superintendent if I could tell him anything about a certain appliance. He had looked through the trade papers, but could not find from these what he wanted to know. By no means is this an isolated example. There are thousands of engineers similarly situated. If you are an advertiser it lies with you to tell these men about your manufactures. Tell them in the right way, by means of good copy and distinctive and refined display, and you will have every reason to congratulate yourself on the adoption of modern and efficient methods of advertising. A factor that the advertiser who uses indifferent copy will have to contend with in the near future is, that as his competitors improve the style of their advertisements, so his will decrease in interest, attraction, and strength.

Ernest Ingram Hill.

Wimbledon, *October 14th*, 1918.

Patent Law Reform.

Apropos of the criticism of the two proposed new Bills, *i.e.*, the Trade Marks Bill and the Patents and Designs Bill, "1917," towards the end of last year and during the present year, it may be interesting to your readers to know that these Bills have now been withdrawn and are dead.

As the result of the question being raised, conferences were held in the larger cities of the kingdom which culminated in the formation of a General Committee in London which ultimately adopted a comprehensive report drawn up by the Institution of Electrical Engineers for presentation to the President of the Board of Trade. By arrangement, a large and influential deputation, consisting of doctors of science, inventors, electricians, patent experts, and representatives of technical and scientific societies, and some of the principal progressive industries in this country, was formed and appointed to wait upon Sir Albert Stanley to place before him its views on the imperfections of our patent system, and the grievances under which inventors in this country suffered.

It was ultimately settled that Sir Albert Stanley would receive the deputation last Thursday, 10th inst.; it was rather unfortunate, however, that though the meeting had been arranged for with Sir Albert a considerable time ahead, and even after the day and hour had been fixed and confirmed the time of meeting was put back one hour at Sir Albert's request by telephone, he (Sir Albert) was not present, but sent a deputy in his place, much to the regret of the deputation, many of whom had come so far to lay their views before the Right. Hon. gentleman on a matter so important to "*the commerce and industry of the country after the war*," upon which Sir Albert had been lecturing lately throughout the United Kingdom.

Some of us, old enough to remember being present in the same room in 1883, when the late Mr. Joseph Chamberlain as President of the Board of Trade met a somewhat similar deputation, and eloquently spoke to us on the benefits of invention and its encouragement, just before introducing his own revolutionary Patent Bill of 1883, could not very well help comparing our reception *then* and *now*, with so much more at stake in competition after the war.

Anyone who knew the late Mr. Chamberlain, with his proud, imperial, and patriotic spirit, and who magnified every public office he ever held, could scarcely conceive his delegation of the reception of any such representative deputation to a deputy. Apart from that, however, the deputation was led inferentially from the chair to understand that no new Bills had yet been drafted, while the various speakers of the deputation urged with considerable force, an automatic moratorium or prolongation of patents to meet war conditions, the protection of inventions relating to food, medicinal or surgical products, the importance of product claims to chemical and other industries, the extension of the term of patents, the period of provisional protection, the period of acceptance of the complete specification, the reduction of patent fees, the protection of patentees in relation to utilisation of their inventions by the State, the limitation of provisions for revocation of patents, the abolition of the com-

pulsory working of patents which principally benefited foreigners, and especially Germans, the safeguarding of patents of addition, the formation of a special tribunal to deal with patent cases, and the adoption, if possible, of a British Empire patent system. In regard to the latter, Sir Robert Hadfield graphically pointed out the absurdity of the present Canadian patent system (part of which system was incorporated in the proposed Bill of last year), under which he found he had to pay the sum of eight guineas for a type-written copy of a Canadian specification, while the British printed specification of same only cost here some 2½d. As regards the moratorium, patentees do not want any one-sided favours, but they desire justice. In my own knowledge there are patents for apparatus, say, for street and other lighting, &c., on which renewal fees are being regularly paid, which have been turned into dead letters by the Government war restrictions, and surely it is only fair that an extension of time should be given these in the proposed new Bill? Then as to the necessity for compulsory working clauses, why should these be required here any more than in the United States, unless to prevent us getting so good terms from other countries as the Americans do get because they have no compulsory working under their more perfect patent system? Unquestionably, our principal competitors after the war (Germany, let us hope, being barred) will be our American friends, and it is very desirable in the interests of invention, commerce, and industry in this country, that we should have equal opportunities with our American Allies, to say the least. We were promised by the Board of Trade representative that all these various matters would receive earnest consideration in the preparation of the new Bill, but, to my mind—the end of the war being now at least in sight—the question comes to be, would it not be better now to wait till the war is over, and then if possible secure a new Bill on American lines, formed on Democratic principles to suit our conditions for the whole British Empire, in order that Britishers here and throughout the Dominions could have had an opportunity of holding our own in the race for the coming world's business?

James Keith.

Leigh-on-Sea, *October 12th*, 1918.

The Electrical Industry in Russia.

We have read with interest the article by Mr. Allan Monkhouse on "The Electrical Industry in Russia," which appeared in your journal of September 20th.

In this, reference is made to Mr. H. Ledward, of Moscow, amongst others, having developed workshops for the construction of electromedical apparatus.

We should like to say that Mr. Ledward is our agent in Moscow, where, by arrangement with us, he manufactured certain apparatus of this type, in addition to the goods we exported to him.

Owing to the Russian situation, this work has, of course, had to be suspended for some time, but we have every hope of resuming business with Mr. Ledward as soon as national circumstances permit.

We shall be obliged if you will insert this letter in the next issue of your journal.

Newton & Wright, Ltd.
E. E. Burnside.

London, W., *October 9th*, 1918.

The Electrical Power Engineers' Association.

The Marylebone branch will be glad if you will allow it, through the medium of the Review, to ask Mr. Jones four questions:—

1. Is his union a registered trade union?
2. By whom was this particular "union."(?) formed?
3. From what cause was it formed?
4. For what purpose and with what intent do the sponsors and members allow it to continue in existence?

The Marylebone branch feels that there are enough unions in existence to cater for every shade of thought and opinion, and some of the members have viewed with some misgiving the efforts of small and unknown bodies. In the circumstances, therefore, the branch will be glad to have the particulars asked for.

John Vincent,
Secretary,
National Amalgamated Union of Enginemen, Firemen, &c.

London, N.W., *October 14th*, 1918.

WAR ITEMS.

German Army Electrical Plant in Galicia.—The Governor of Galicia, as the National Central for the Economic Reconstruction of Galicia, acting with a group of electrical engineers, has bought from the German Army all the electric plant (machinery, wires, and installation materials) constructed by the Army in East Galicia, on the River Seret, while this was a theatre of war. The German Army built an electric power station on the Seret, and constructed a network of H.T. cables of 1,500 volts extending from Tarnopol to Borszczow. Transformers set up in towns and villages reduced the voltage to 220 and 110 volts. The energy was supplied either by water or by special steam-engine plants.—*Nowa Reformer*, September 4th.

Restoration of Trade Union Conditions.—In the course of a leading article on the War Pledges Bill, under which the Government proposes to give effect to its war-time agreement with the trade unions, the *Manchester Guardian* says: "The passing of the Act is the first stage in the series of constructive measures without which the war will be followed by industrial chaos."

Second-hand Boilers.—By order of the Ministry of Munitions second-hand steam boilers of any type "not being a boiler for use in any locomotive, motor car or vehicle, or on a ship or other vessel," may not be purchased or sold or otherwise dealt in without a permit obtainable from the Controller, Department of Engineering, Charing Cross Embankment, W.C. 2.

Blinded Soldiers at the Siemens-Schuckert Works.—According to a German paper, an experiment was made with 39 blinded soldiers at the Siemens-Schuckert small-wares factory, and as they proved a success the number was more than doubled. The men begin with six hours' work, which is later increased to 8½ hours. Most of them prefer machine work to hand work, because it gives them more control over the progress of the work. The machines are provided with ingenious protective arrangements, and the men soon learn to use them very skilfully. Some are able to work two machines at once. They have been very successful even with the turning lathe. So far as possible an employment resembling their former occupation is found for them.

A hostel for unmarried blinded men has been established, by private enterprise, near the works, which are in Siemensstadt, Berlin, and a row of houses with gardens has been provided near the same factory for the married men employed there.

Industrial Conditions after the War.—The general question of the position of women workers after the war has just been considered at an unofficial conference between leading trade union women and employers of labour arranged by the National Alliance of Employers and Employed, Mr. F. Huth Jackson presiding. The first question discussed was whether the one and three-quarter million women who, in addition to the three million in industry before the war, now compose the women's industrial army, could be retained in industry after the war. The general opinon was expressed that, while there would be a temporary period of dislocation, during which time the whole community would have to be patient and work on a give-and-take basis, there was little doubt that there would ultimately be work for all, and the whole of the women at present in industry could be retained. The possibility of a minimum wage was discussed, and the meeting was unanimous that such a thing was advisable, and that it should be based on a reasonable standard of life, but would have to vary in different areas. It was also agreed that during the period of demobilisation it would be better to institute a system of part-time work, so that the whole of the workpeople should be employed for part of the day, or part of the week, rather than that some should be employed full time and the rest turned out on the unemployment market. It was anticipated that this period would be only temporary, and ultimately all would be reabsorbed.

Dissatisfaction was expressed at the delay in the production of definite and co-ordinated plans by the Government, and the conference adjourned, agreeing to meet again either to consider the Government's demobilisation proposals or, failing that, to formulate its own on the nearer approach of peace.—*Daily Telegraph.*

Wages after the War.—An official statement was issued last week as follows:—

The situation which may result at the end of the war, in regard to the various wages awards which have been made during the war, has for some time been under the consideration of the departments concerned. The present scale of wages in many occupations depends upon the compulsory enforcement of awards which were made in view of circumstances arising out of the war; but the machinery for enforcing these awards will not continue after the war. It is necessary, therefore, to consider whether the compulsory operation of such awards should be continued during a period of transition after the war, and also whether the power to make such awards should be extended so as to cover the same period. With a view to immediate action on the subject the Minister of Reconstruction is appointing a committee with the following terms of reference:—

1. Whether the compulsory operation of awards made under the Munitions of War Acts, of orders extending such awards, and of orders regulating wages made under those Acts, should be continued after the war.
2. Whether the power to make such awards or orders should be continued after the war.
3. The manner in which awards and orders if made or continued should be enforced after the war and for what period.

Sir John Simon, K.C., M.P., is chairman of the committee, which will consist of representatives of employers and trade unions, besides representatives of Government departments.

The Urgency of Reconstruction Problems.—In the course of its leading article on "Reconstruction Problems" last week *The Engineer* says: "The work of reconstruction must no longer be regarded as a subject for discussion, but a case for action. Until now, except for the formation of a few of the Whitley Industrial Councils, and the work of some trade organisations, little has been done. The peace for which we have fought, and are fighting, may, however, come in the end as suddenly as the war cloud burst in 1914, and we dare not be found unprepared for the change of load on the industrial machine which will then occur. A fairly accurate general idea can even now be formed as to the character of the new duty, and the heavy peak demands which will have to be met, and it is time that the task of modifying the design of the industrial machine to carry the load was taken seriously in hand. There are still some perhaps who imagine that the old machine stripped of the auxiliaries made necessary by war service will suffice for our needs, but the majority are convinced that considerable, and perhaps radical, changes in design are necessary. The real point now at issue turns on the modifications which will best meet the peace needs of industry, and how they can without further delay be embodied in a design which the majority will accept as a genuine attempt to solve the problem."

Exemption Applications.—At Castleford, William Burrow, tramway inspector, Grade 2, made a personal appeal, and had the support of the manager of the tramway company, who stated that he was in a certified industry and could not be called up until decertification by new regulations. He was granted three months' temporary exemption without volunteer drill.

At Maidstone, the Corporation Tramways Committee appealed for A. E. Chittenden (40, Grade 2), driver and assistant inspector, claimed to be indispensable. Three months were conceded, with no volunteer service.

At Ilfracombe, the Electric Light and Power Co. appealed for H. J. Stewart, resident electrical engineer; T. H. Sanders, electrician, and A. J. Rudd, relief stoker, &c. Sanders was given until March 1st, and as the others hold protection certificates, the appeals were refused, with leave to re-appeal if the certificates were withdrawn.

Exemption until March 27th has been granted at Windermere to J. Reed, foreman shift engineer, engine driver, and switchboard attendant at the electricity works.

At Trowbridge, six months' exemption was conceded to E. T. Charnbury (32, Grade 1), electrician to Messrs. J. and T. Clark.

Romford Urban Tribunal has refused exemption, with one month's grace, to H. North (31, Grade 3), electrical engineer.

At Rotherham, exemption until January 3rd was granted to W. Martin (41, Grade 1), tramway track layer, engaged with the Corporation.

Maidstone Tribunal has granted six months' exemption to A. T. Lambert (42, Grade 2), manager of the Corporation tramways.

At Castleford, the manager of the Tramway Co. appealed for W. Burrows (Grade 2), inspector, claiming that he was in a certified industry, and would not be called up until decertified by new regulations. He was granted three months' temporary exemption.

At Dartford, on October 7th, a review was made of the case of E. Vane (41), electrician, and the exemption certificate was withdrawn.

A MOST UNPLEASANT STORY.

By "IMPERIAL."

It was, I believe, Lord Avebury of whom it was said that bankers thought him a great scientist, while scientists believed him to be a great banker. The *Times* Literary Supplement, in reviewing Mr. Oliver Onions's latest book, "The New Moon—A Romance of Reconstruction," says that too much is made of the development of electricity, and too little of the development of human nature. We agree that so far as human nature is portrayed in this book, its development is unpleasant and undesirable. Apparently the surviving types are to be successful business men of the Birmingham calibre, journalists who run the political affairs of the country with open flippancy, the worst class of Ministry of Munitions official, and masculine young women with a deplorable lack of reticence in their marital affairs and sense of humour. It is at least to be hoped that if the girls of ten years hence are to broaden their humour as well as their outlook, they will find some better story to tell than that of vivandières being *hors de combat*.

The development of electricity is perhaps not so obvious to the technical mind as it may be to the detached literary observer. Apparently it consists of two things, the first of which is the use of our rivers to run generating stations. It seems to be a common idea that because a river in Norway, or Italy, or India can run a generating plant of 100,000-kw. capacity, the same can be done in England. At a lecture to a learned society on the Tata hydroelectric scheme, I once heard the question asked: "Why are all these hydroelectric stations in the hills, where the laying of pipe-lines and the erection of overhead transmission is difficult and costly? Is there not as much water in the plains?" This question seems to be unanswered in the minds of many people, including Mr. Onions. In connection with these hydraulic schemes, there is apparently also some intention of "trapping the tides," but we are not given any clear conception as to how it is to be done. This perhaps is not difficult to understand, since engineers in this book multiply five-figure numbers without slide rules, and express head of water in foot-pounds.

The second development is in the direction of household electrification. One presses a button in the kitchen, and a washing-up machine does all the work of a scullery maid, while in other similar ways all household labour is abolished. It is not clear whether this machinery never breaks down, or whether there is a large and expensive staff of mechanics and electricians to keep it in working order.

It is this sketchiness which is the damnation of the book. The conversation, when it is not laborious lecture, is in half-finished snatches, with incomplete sentences concluded by suggestive dashes. In two pages the question of the evangelical and the ritualistic church is dismissed with airy patronage and contempt—and so is the fact that the whole scheme of post-war reform will only be started because the returning soldiers began murdering munition workers.

It is on this latter point in particular that the whole book falls. Its faults of conversational style are to be expected in a frankly propagandist novel, it is perhaps better to leave explanations of hydroelectric schemes to the technical Press, and religious dogma is always better left alone, but a forecast of the future which leaves all industrial reform, and all reconstructive effort, to be started because the masses have broken into open murder is, we hope and pray, totally false. And yet perhaps in this Mr. Onions is a true prophet. Amongst business men, how frequent is the remark, "There is bound to be a revolution when the war is over." One responsible engineer has even added that we shall fortunately have a large Army to keep order. It is a very prevalent opinion that when peace is restored, events will happen far too quickly for us to cope with them, and that there is bound to be a period of upheaval, from which we, being more lucky than Russia or other nations, shall emerge triumphant, cleansed and revivified. A medley of forces run riot is to accomplish reforms that have been dreamed of for centuries.

We must recognise now that our war measures will last for a while at least when the war is over. We must also realise that the object of reconstruction is not to revert as rapidly and as completely as possible to the conditions of July, 1914. Thirdly, we must deduce from this that although we are now directing every effort towards winning the war we must always direct our industrial policy so that it shall be applicable, with reasonable modifications, after the war is over. If we confine our thoughts to the present we undoubtedly shall achieve chaos when we reinstate the returning troops. The industrial structure we have erected to win the war cannot be cast down and a new one built up while our transports bring men from France. Moreover, much that has been done is on too solid foundations, or, to vary the metaphor, has its roots too deeply into our daily life, to be easily removed. Many reforms have been introduced unnoticed, or in some cases amidst a chorus of praise, which in other times would have been resisted in the last ditch. July, 1914, was not, except by comparison, a happy time. Looking back on it now, we envy its freedom from care—there was no war on. If, however, the end of the war could land us back there again, it would be an unmitigated disaster. We want to win something out of the war—we want a happier, cleaner, pleasanter world. We do *not* want to continue under the present restrictions on personal liberty. We do *not* want each man to be ticketed, labelled, and started off to run steadily along a groove from which he can never escape. We do *not*, we most *certainly* do not, want to live so that each man does the maximum of work, and has the minimum of liberty to devote to his home and his personal happiness. The knowledge that someone else is striving so to order the world that the streets are clean, your home is well built, and the sanitation is perfect, is no recompense for the loss of your own individuality. Every man must work to keep himself, perhaps, but work is only a means to an end, and is not a god to be worshipped.

That is one side of the picture—the other is that the work each man does must be useful, not only to himself, but to the community. We do not want to go back to the time when the advertising agent who could talk was the most successful, and thought himself the most important, man in the world. We do not want to go back to the time when the paid agitator was a power in the land, and was regarded as the voice of labour. Unproductive effort should not be profitable—and most men know, and are sufficiently honest to admit to themselves, whether their work is useful, or whether they are merely looking busy, churning up mud in a backwater.

If only the urgency of the question be recognised, we can so model our present actions that the task of reconstruction shall be half accomplished before war ends, and so that the return of our armies shall not involve chaos. In this way, we may achieve progress and attain a state which shall be a fitting memorial to those who have fallen. We may also avoid the incarnation of the worst elements of the Civil Service which Mr. Onions has foretold as our ultimate fate, and we may even create such a world that in years to come we may look back on "The New Moon" and say, "Thank God it was a Romance."

BUSINESS NOTES.

The Board of Trade Provisional Advisory Council.—It is announced in the *Board of Trade Journal* that pending the formation of an Advisory Council for the Board of Trade on a permanent basis, the President of the Board has invited the chairmen (or other representatives) of various Committees, including those on Trade After the War; the Presidents (or other representatives) of the Association of Chambers of Commerce and the Federation of British Industries, and representatives of Labour interests, to form a Provisional Council to advise the Department of Commerce and Industry. The Council also includes representatives of the Foreign, Colonial, and India Offices, and the Dominion Governments have been invited to nominate members. The Council consists of :—

Sir Henry Birchenough, K.C.M.G. (Empire Cotton Growing Committee).
Sir Alfred Booth, Bart. (Shipping and Shipbuilding Committee).
Lord Colwyn (Empire Flax Growing Committee).
Sir Herbert Dixon, Bart. (Cotton Control Board).
Lord Faringdon (Financial Facilities Committee).
Sir Algernon F. Firth, Bart. (Sub-Committee of Commercial Intelligence).
Mr. James Gavin (Labour).
Mr. Harry Gosling, C.H. (Labour).
Mr. G. Grindle, C.M.G. (Colonial Office).
Right Hon. F. Huth Jackson (Trade Relations After the War Committee).
Mr. L. J. Kershaw, C.I.E. (India Office).
Mr. E. Manville (Association of Chambers of Commerce).
Mr. G. A. Moore (Advisory Committee to the Department of Overseas Trade).
Sir Gerard A. Muntz, Bart. (Non-Ferrous Metal Trades Committee).
Mr. J. W. Murray (Advisory Committee to the Department of Overseas Trade).
Sir Adam Nimmo, K.B.E. (Coal Trade Committee).
Mr. J. W. Ogden (Labour).
Hon. Sir C. A. Parsons, K.C.B., F.R.S. (Electrical Trades Committee).
Mr. G. Scoby Smith, C.B.E. (Iron and Steel Trades Committee).
Sir Richard Vassar Smith, Bart. (Federation of British Industries).
Mr. Douglas Vickers (Engineering Trades Committee).
Sir H. A. Walker, K.C.B. (Railway Executive Committee).
Sir Frank Warner, K.B.E. (Textile Trades Committee); and
Mr. Victor Wellesley (Foreign Office), together with the representatives of the five Self-Governing Dominions as soon as nominated.
Mr. S. J. Chapman, C.B.E., and Mr. Percy Ashley, Assistant Secretaries to the Board of Trade, will act as General Secretaries to the Council.

Cable Urgently Needed.—We are glad to learn that the wants of the Guildford Electricity Supply Co., Ltd., of which we made brief mention in our issue of October 4th, were very promptly met by the kindness of an electricity works in the North of England.

Copper Wire in Australia.—The manufacture of copper wire has been commenced at the works of the Metal Manufactures, Ltd., Port Kembla, which cover an area of about one acre.

Swiss Export Trade Problems.—In the course of a recent report, the Association of Swiss Machinery Manufacturers referred to the fact that the loss of export trade after the war would be fraught with dire consequences to the economic life of the country. In case Switzerland as a neutral country should succeed in concluding favourable commercial agreements allowing of Swiss products receiving here and there perhaps a certain degree of preferential treatment, there was a danger that Switzerland would have to be used by other countries as a transit country. First of all, therefore, the "neutralisation" of foreign products by commercial firms, assembling workshops, and the like would have to be prevented. But the removal of actual manufacture from foreign countries to Switzerland and her too great industrialisation would also be undesirable.

Trade Announcements.—With the object of meeting the increased demand for their A.C. motors, Messrs. F. Parkinson and Co., of Wells Works, Guiseley, Leeds, have considerably enlarged their business under the title of F. & A. Parkinson, Ltd., and their manufacturing capacity is being rapidly extended.

As a beginning, the output of small standard polyphase motors up to 10 H.P. or thereabouts has been greatly improved, and stock is now available. This will be extended to include larger sizes of polyphase motors, together with Parkinson single-phase commutator motors, built under Creedy's patents. London stores have been opened, and stock motors and spare parts are held there, as well as at the works. A list of stock motors will be supplied on application.

List No. 2 of 16 pages, which has just been issued, covers the small size polyphase motors. Details are fully tabulated, technical information and specification are included, prices are plainly shown, and excellent half-tone illustrations appear. At the London stores there is a complete machine shop equipment for repairs.

The new address of Messrs. Watson & Sons (Electro-Medical), Ltd., is Sunic House, Parker Street, Kingsway, W.C. 2. New telephone numbers: "Regent 1227 and 1228."

Liquidations.—Weaverham Electricity Supply Co., Ltd.—A petition for the winding up of this company, presented by Messrs. Johnson & Phillips, Ltd., judgment creditors, will be heard at Nantwich on November 30th.

New Vanadium Alloys, Ltd.—Creditors to send particulars of debts, &c., to the liquidator, Mr. T. A. Ward, 25, Great Pulteney Street, W. 1, by November 20th.

Plant for Disposal.—Rochdale Corporation Electricity Committee invites offers for one Belliss-Morcom-B.T.H. 220-kw., three-phase, 3,000-volt steam alternator. Particulars are given in our advertisement pages to-day.

Greek Works Visit.—The Greek Delegates who, as already stated here, are on a tour of business and industrial centres in this country under the auspices of the Federation of British Industries, visited Carron Works on Wednesday, October 9th. The party were conveyed in motor-cars from Larbert Station to the Dobbie Hall, where they were entertained at lunch by Carron Co. under the chairmanship of the company's manager, Mr. Geo. Pate, supported by Bailie King, chairman of the National Light Castings Association; Mr. Robert McFarlan, C.A. (of Messrs. Kerr, Andersons and McLeod, the organiser for Scotland of the Federation of British Industries); and by Mr. G. E. R. Young, assistant organiser. After lunch the party proceeded to Carron Works, and were conducted through the various departments of the Low and Mungal Foundry. Tea was served in the company's canteen at Mungal Foundry, after which the party proceeded to Glasgow.

Book Notices.—*Technology.* Vol. IX.—The "Journal of the Manchester Municipal College of Technology," which records investigations undertaken by members of the college for the year 1915, is one of those works which we cannot but regard with pride. Printed in the Department of Printing and Photographic Technology of the College itself, its production leaves no loophole for criticism—it is equal in typography, illustration, and paper to any of the most high-class periodicals with which we are acquainted; it is a pleasure merely to turn over the pages and to observe the excellence of the work. Its literary contents are, of course, extremely diversified, dealing with educational questions, physics, electrical engineering, chemistry, textile processes, civil engineering, the smoke problem, printing, &c. They include Prof. A. B. Field's I.E.E. paper on the design of high-speed generators (in which, by the way, fig. 4 is printed upside down); papers by Mr. S. Butterworth on the coefficients of self and mutual induction of coaxial coils, and on electrically maintained vibrations; an inquiry into the possible existence of mutual induction between masses, a gravitational problem, by Prof. Miles Walker and Mr. W. W. Stainer; an article by Mr. S. Lees on the theoretical efficiency of the Diesel engine, and one by Mr. S. Evans on some metal failures. The volume reflects the greatest credit on the College and all concerned in its production.

"Steel Structures." (*Journal* of the Steel Structural Section of the British Engineers' Association.) July, 1918. London: The Association. Price 6d.

The *M. & C. Apprentices' Magazine* for October contains the usual variety of interesting articles, including one on the Murman Coast, reminiscences by Alderman Duncan Watson of his joining the firm of Muir, Mavor & Coulson 30 years ago, a thrilling account of a trip in a biplane, and a variety of cadet notes, camp notes, &c. The high quality of the magazine is well maintained.

Control of Rubber.—In view of the necessity for saving ocean freights, the rubber trade has been officially notified that the Minister of Munitions has appointed a Committee, under the chairmanship of Sir Clarendon Hyde, to advise him as to the control of rubber. In the meantime, it is deemed necessary to issue a warning that it may become necessary to fix maximum prices for transactions in rubber, and to point out that the Minister may be compelled to make orders rendering inoperative any forward contracts or transactions entered into after the publication of this notice.

Kynoch's and After-War Plans.—In their report, the directors of Kynoch, Ltd., say that the company is directly pledged to very little in the way of new manufactures after the war. They consider that the future is so speculative that a "wait and see" policy is better than one of choosing now a number of new trades and trusting to luck that the choices made will turn out to be happy ones. More especially do they believe this to be sound, as, in their opinion, opportunities after the war of coming to the assistance of businesses with assured prospects will not be at all infrequent.

Catalogues and Lists.—Messrs. Johnson & Phillips, Ltd., Charlton, S.E. 7.—Booklet (10 pages) giving data and net prices, revised, of their V.I.R. cables, for the use of trade friends in their estimating work.

Broom & Wade, Ltd., High Wycombe.—Pamphlet describing the Hyatt roller bearings as applied to cranes, trucks, &c. The essential feature of these bearings is the hollow flexible roller. Dimensions and loads are given.

Messrs. Higgs Bros., Summer Hill Street, Birmingham.—Stock list of shunt-wound protected motors.

Industrial Council for the Brass Trade.—According to the *Birmingham Post*, an important conference will be held in Birmingham on November 12th between representatives of the Ministry of Reconstruction and representatives of the brass and copper trades, the object being to discuss the formation in the brass and copper trades of an Interim Industrial Reconstruction Committee.

Non-Ferrous Metal Industry Act.—The *London Gazette* for October 15th contains a list of further licences granted by the Board of Trade under this Act.

Women in Industry.—A Conference on Women in Industry will be held under the auspices of the Reconstruction Council, on Tuesday, October 22nd, at 6 p.m., in the Hall of the Institute of Journalists, 2 and 4, Tudor Street, E.C. 4. The subject will be introduced by Miss Lilian Dawson, secretary of the Fabian Society, Women's Group, after which the discussion will be open. No tickets are necessary.

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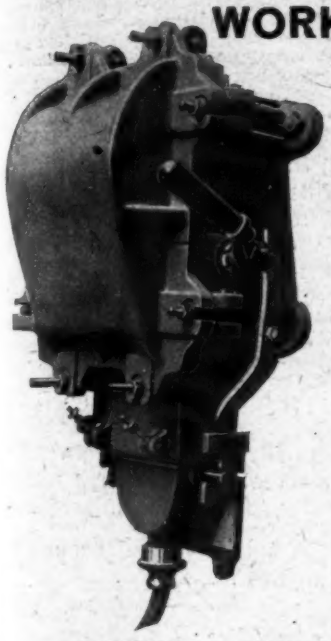

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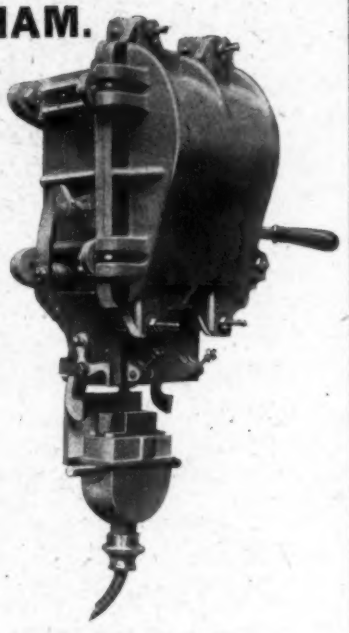

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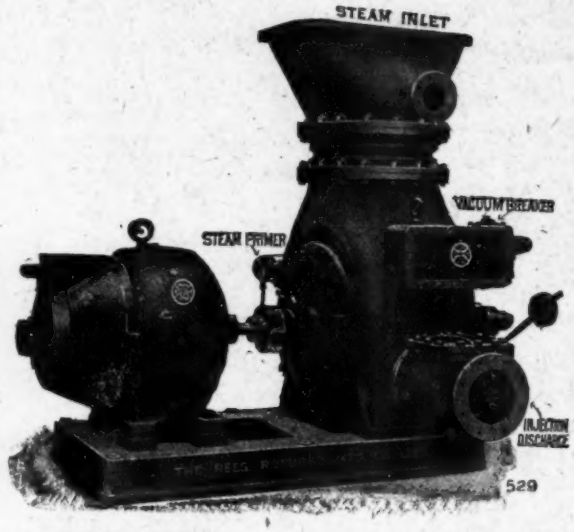

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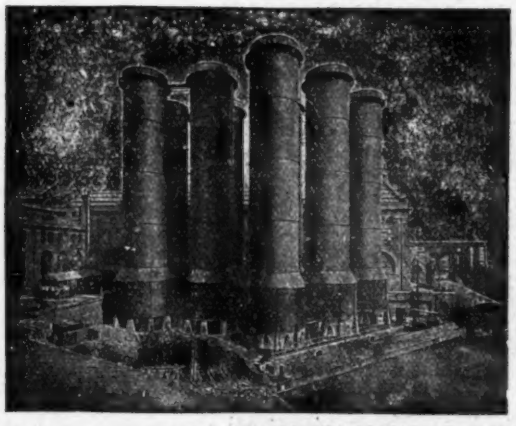

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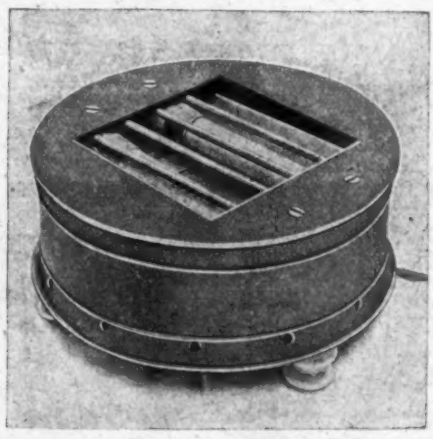

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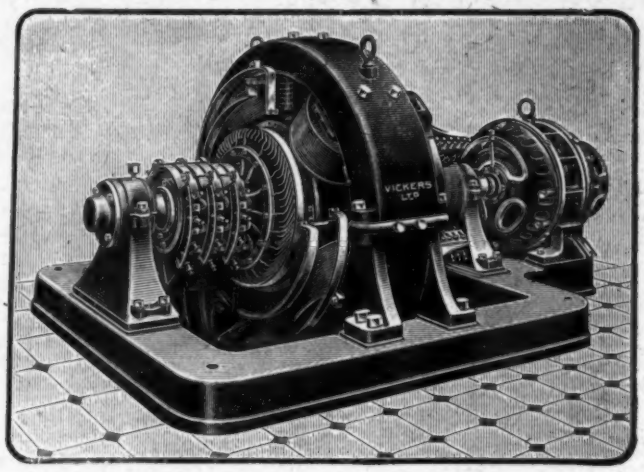

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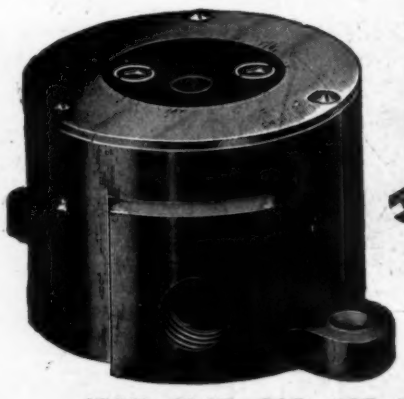

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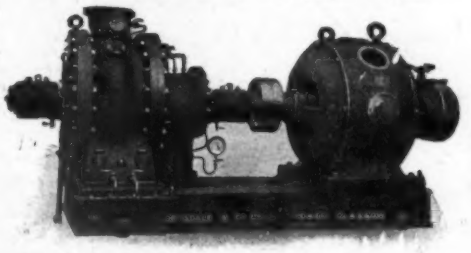

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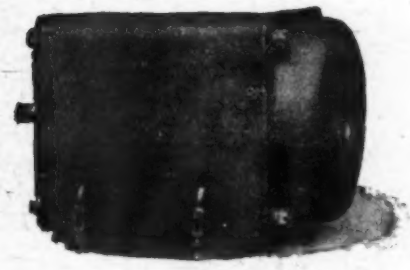

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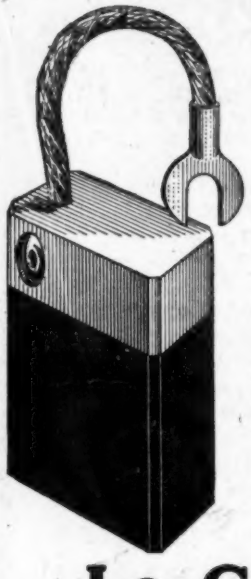

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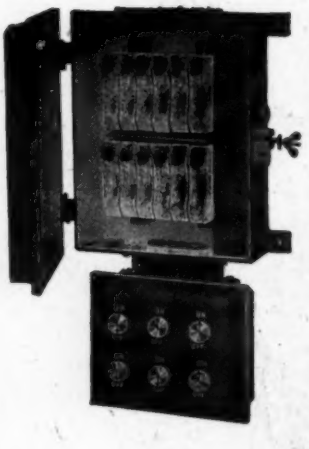

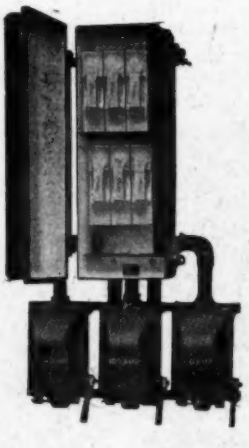

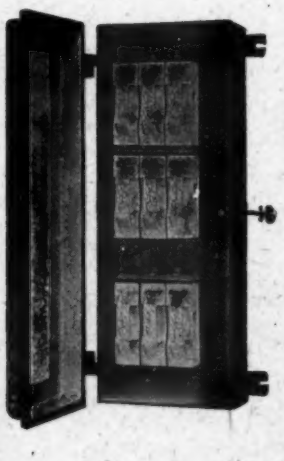

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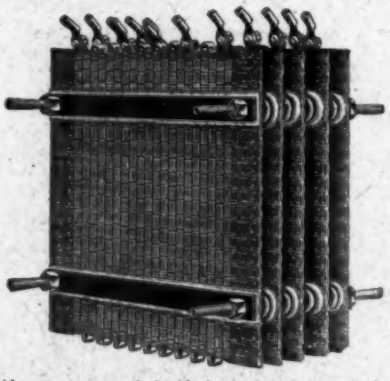

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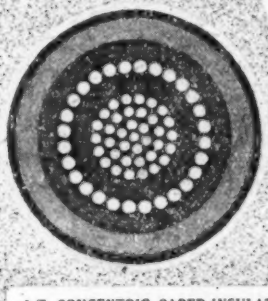

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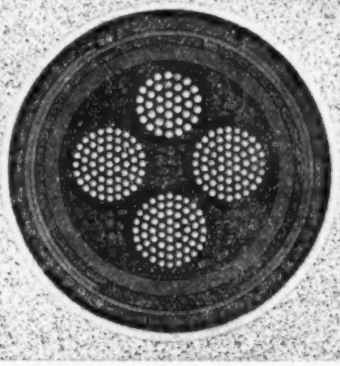

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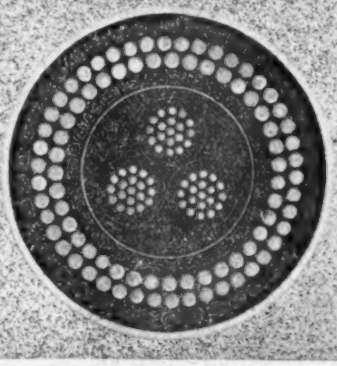

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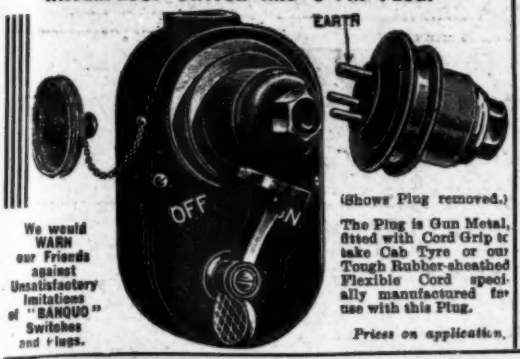

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This System will commend itself to engineers as an improvement on the practice of mounting a number of switches inside the same box as the fuseboard and in place of straggling single units. The switches are mounted on one iron base, this being usually fitted in proximity to the distributing fuse-box. The switches are foolproof, and saving is effected in cost and labour. The words "ON" and "OFF" are cast on the lid, and the switch handle is of cast gun-metal, giving a substantial yet neat appearance. The boxes can be drilled and screwed to requirements, and there is ample space inside cases for safety and ease in wiring.

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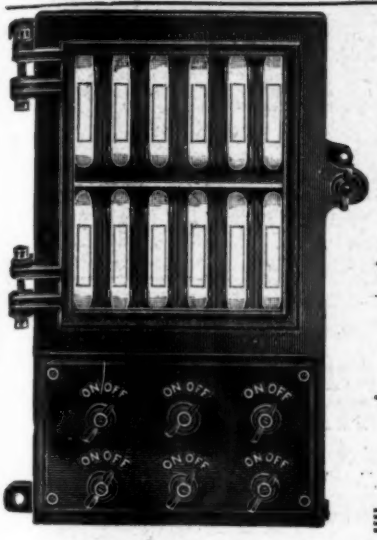

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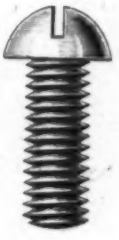

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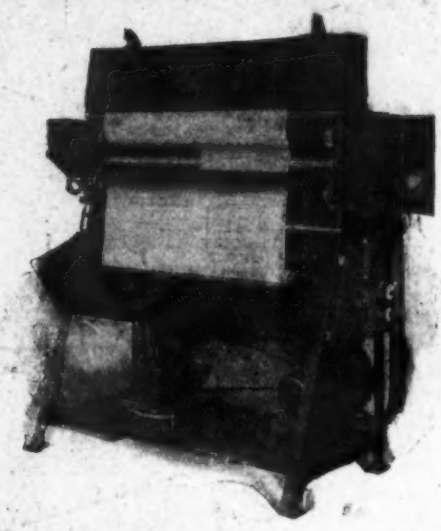

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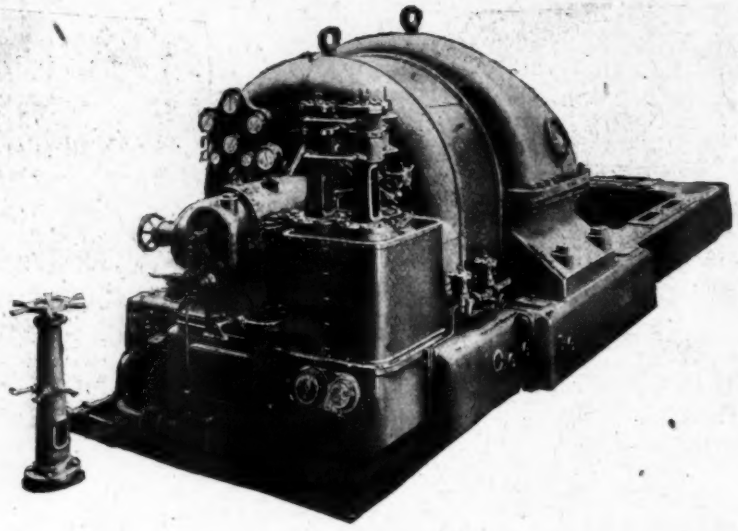

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Original Testimonials should never be sent.

TELEGRAPH STOREKEEPER.

TELEGRAPH STOREKEEPER required for the Post and Telegraph Department of the East Africa Protectorate, for a tour of twenty to thirty months with possible extension.

Salary £200—£10—£300 per annum. Free quarters, and second-class passages. Liberal leave in England on full salary.

Candidates, age between 22 and 45, who have had experience in electrical storekeeping, and possess a knowledge of the accounting of stores, should apply at once (by letter), stating qualifications and experience, to THE CROWN AGENTS FOR THE COLONIES, 4, Millbank, S.W. 1. Men engaged on Government work, or eligible for military service, will not be considered. 2926

FOREMAN WANTED.

FOREMAN wanted by large electrical concern to take charge of manufacture of electrical instruments for industrial purposes. Applicant must be able to supervise both male and female labour on machining and assembling operations, fix piecework prices, and have had experience in a responsible position on similar work. Permanent and progressive position. No one already on Government work will be engaged.

Apply, with particulars of experience, age, and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning No. A 6123. 2786

SHIFT ENGINEER.

WANTED, Shift Engineer, experienced in E.H.T., A.C. and L.T., D.C. three-wire supply, with rotary converters.

Applications, stating age, training, experience and salary required, together with date when able to commence duties, to be addressed to MR. T. W. HIBBERT, Acting Borough Electrical Engineer, Electricity Works, Barnsley, endorsed "Shift Engineer."

W. P. DONALD,
October 14th, 1918. *Town Clerk.* 2905

FITTER DRIVER AND ENGINE DRIVER.

WANTED, Fitter Driver; also Engine Driver, used to high-speed internal-combustion (oil) electric generating plant. Wages £1 15s. and £1 5s., plus 12½ % respectively.

Applicants, who should be ineligible or discharged from military service, should apply, stating age, experience, together with copies of testimonials, to the DIVISION OFFICER, R.E., Crowborough Camp, Sussex. 2890

WIREMAN LINESMAN AND MATE.

WANTED, Wireman Linesman and Wireman Linesman's Mate, hutted camp, Crowborough district. Wages £2 and £1 5s., plus 12½ % respectively.

Applicants, who should be ineligible for or discharged from military service, should apply, stating age, experience, together with copies of testimonials, to the DIVISION OFFICER, R.E., Crowborough Camp, Sussex. 2891

ENGINEER-IN-CHARGE.

WANTED, Engineer-in-Charge, to take charge of high-speed internal-combustion (oil) electric generating plant, and superintend maintenance of cables and wiring hutted camp; Crowborough district. Wages £3, plus 12½ %.

Applicants, who should be ineligible for or discharged from military service, should apply, stating age, experience, together with copies of testimonials, to the DIVISION OFFICER, R.E., Crowborough Camp, Sussex. 2889

SITUATIONS VACANT.—*Continued.*

COUNTY BOROUGH OF WARRINGTON.

Electricity Department.

THE ELECTRICITY AND TRAMWAYS COMMITTEE of the County Borough of Warrington, invite applications for the post of Shift Engineer.

Experience in H.T. and L.T. systems necessary.

Salary £3 14s. 6d. per week, including bonus.

Forms of application and list of duties can be obtained from the undersigned.

Applications to reach me not later than first post on TUESDAY, NOVEMBER 4th, 1918.

F. V. L. MATHIAS,
Borough Electrical and Tramways Engineer.
Howley, Warrington. 2883

SOUTH SHIELDS CORPORATION.

Electricity Department.

CHARGE ENGINEER.

REQUIRED immediately, Charge Engineer, with experience of A.C. and D.C. Turbine and Reciprocating Plant, Rotary Converters, &c. Wages for 7 shifts of 8 hours (56 hours per week), £4 4s. 11½d. per week (including all bonuses to date), and 14 days' holiday per annum with pay.

Apply, stating age and experience, together with copies of testimonials, to the undersigned, stating date for commencing duties from date of appointment.

HARRY S. ELLIS,
Borough Electrical Engineer. 2859

SHIFT ENGINEER.

SHIFT ENGINEER wanted at once (controlled undertaking); experience of B. & W. Boilers, Turbo-Alternators, and E.H.T. A.C. Supply essential. Salary £3 17s. 6d. per week (inclusive of all bonuses to date), plus overtime rate for any additional time worked.

Apply, stating particulars of age, training and experience, with copies of recent testimonials, to—

THE ENGINEER,
Electricity Works, Redditch, Worcestershire. 2771

ELECTRICAL CONTRACTORS.

WORKING MANAGER required for the Manchester House of a firm of Electrical Contractors. Commencing salary £200 per annum, and good commission on profits. Applications treated in confidence, and should state fullest particulars and whether applicant could introduce post-war business. No person on Government work, or residing more than 10 miles away, will be engaged.—

5807, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

BOROUGH OF AYLESBURY.

WANTED, a Man with some fitting and central station experience, with a view to his taking up the position of works superintendent at small progressive works. Salary £3 10s. per week.—Apply, stating age, experience, and technical training, with copies of one or more testimonials,

W. A. TURNBULL, A.M.I.C.E.,
Electrical Engineer,
Aylesbury. 2961

SHIFT ENGINEER.

SHIFT ENGINEER at the Eccles Corporation Electricity Works (certified undertaking); must have good electrical and mechanical experience. Wages £3 17s. 6d. per week (inclusive of all bonuses).

Applications, stating age, experience, when at liberty, &c., with copies of recent testimonials, to be forwarded forthwith to the BOROUGH ELECTRICAL ENGINEER, Electricity Works, Cawdor Street, Patricroft, Lancs. 2920

SHIFT ENGINEER.

SHIFT ENGINEER wanted, with previous experience in direct-current, three-wire and traction supplies, high-speed, direct-coupled steam sets. Experience with rotary converter equipments will be a recommendation. Wages £3 5s., plus 12½ per cent. per week of 56 hours. Certified undertaking.

Applications, giving experience, age, to be sent to the ENGINEER AND MANAGER, Electricity Works, Lomax Street, Radcliffe, Lancashire. 2911

MAINS ASSISTANT.

MAINS ASSISTANT required in the North of England; discharged soldier preferred. Salary £3.—State age, experience, to 2808, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

CHARGE ENGINEER.

CHARGE ENGINEER required for small E.H.T. single-phase station. Applicants should have had previous experience in the operation of Turbines, High-speed Engines, and Water-tube Boilers.

Applications, stating age, married or single, medical category, salary required (inclusive of all bonus), to be addressed to—

D.O., R.E., R.E. Office, South Camp, Ripon.

Copies of recent testimonials should be submitted. 2888

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

ARMATURE Winders, used to repair shop, D.C. work. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply H. D. & S., 32, Newington Causeway, S.E. 1686

ARC Lamp-trimmer required. Capable of undertaking minor repairs in large stores. No person already on Government work will be engaged.—Apply by letter to nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. 2896.

ASSISTANT Engineers and Assistant Fitters wanted for generating stations at Newbury, Godalming, Hamilton and Berwick. —Write, giving experience, salary required, and army exemptions, EDMUNDSONS ELECTRICITY CORPORATION, LTD., 11, Tothill Street, London, S.W. 1. 2895

BOILER House Foreman wanted, London suburb, Certified Undertaking. Capable of taking charge of boiler house and carrying out repairs to boilers and plant. Wages 45s., plus 20s., plus 12½% for 54-hour week.—Apply, stating age, experience, &c., to 5654, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer wanted, D.C. lighting and traction E.H.T. rotary. London district, Certified Undertaking. Salary, including bonuses to date, £200 per annum.—Apply, giving particulars of experience, age, &c., to 5655, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COIL Winder wanted by manufacturers of control gear. Must be capable of taking charge of winding department. No person already on Government work will be engaged.—Apply, giving age, wages, &c., to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6081. 2727

COMMERCIAL Engineer wanted as Assistant to Export Manager in City office of rapidly growing firm specialising in motor car equipment and electrical machinery. Good opportunity for suitable man. No person resident more than 10 miles away, or already on Government work, will be engaged.—2949, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMPETENT and fully qualified Buyer wanted by London manufacturing company. Conversant with engineering and instrument materials and parts and sources of supply. Must be energetic and keen buyer. No person on Government work, or living more than 10 miles away, engaged.—Apply, stating age, record of experience and salary required, to 5672, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMPETENT Electricians required immediately, full rates. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply W. T. CLARKE & Co., LTD., Electrical Engineers, 10, Silver Street, W.C. 1. 2757

DESIGN Department, North of England firm, requires Assistant with knowledge of either D.C. or A.C. machine design. Applicant must be over 25 years of age and preferably of low category. No person already employed on Government work will be engaged. —Apply, stating age, experience and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning No. A5950. 2736

DISTRICT Engineer required, experienced in O.H. line work, and with good knowledge of plant on consumers' premises, &c.—Apply, stating all particulars and wage required, to SCOTTISH CENTRAL ELECTRIC POWER Co., 1, Kirk Wynd, Falkirk. 2877

DRAUGHTSMAN, mechanical, wanted by railway company in London, with knowledge of electric signal interlocking preferred.—State age and experience, 2904, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN; permanent progressive position offered to capable man with knowledge of small switchgear, fuseboard and general accessory design. No one on Government work, or living over 10 miles from central London, need apply.—State age, experience and salary required, to 2902, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN wanted by Croydon firm, used to electrical mechanical work. No person resident more than 10 miles away, or already on Government work, will be engaged.—5697, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

DRAUGHTSMAN-Designer with technical knowledge required for the research department of a well-known firm of switchgear manufacturers. No person already employed on Government work will be engaged.—Apply, stating age, salary and experience, to your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. 2722.

ELECTRICAL Engineers with thorough Commercial experience required as Managers and Assistant Managers for branch establishments entirely engaged on war work. No applicants will be considered who are eligible for military service, or already on Government work.—Apply by letter to MANN, EGERTON & Co., LTD., 177, Cleveland Street, London, W. 1. 5661

ELECTRICAL Fitter (permanent) required for large Works on Tyneside; standard wages paid. One with experience of H.T. switchgear and general maintenance work preferred.—Apply, giving full particulars of experience, with age, to 2939, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN and Mate required. Accustomed to general lighting and bell repair work. No person resident 10 or more miles away need apply.—KNIGHT, Gerrards Cross. 5798

ELECTRICIANS urgently required at large Shipbuilding Establishment in Birkenhead; men preferred who have had experience with ship work. No person already employed on Government work will be engaged.—Apply at your nearest EMPLOYMENT EXCHANGE, quoting Reference No. A6128. 2795

ENGINE Driver for D.C. station (Certified Undertaking), steam and Diesel engines. Wages, with war advance, £3 2s. for a 56-hours week.—Applications, stating experience, &c., to ENGINEER, Electricity Supply Co., 93, High Road, Chiswick, W. 4. 2953

ENGINE Driver for works power station, high-speed generating sets. Seven shifts of eight hours each. No person at present employed on Government work will be engaged.—State age and experience to JOHN PLAYER & SONS, Castle Tobacco Factory, Nottingham. 2948

EXPERIENCED Foreman or Forewoman required to take charge of flashing and mounting department, carbon filaments. No person resident more than 10 miles away, or already on Government work, will be engaged.—9728, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIMENTALIST required to take charge of small development department in an electrical switch gear works. Good theoretical knowledge necessary. No person already employed on Government work will be engaged.—Apply, giving full particulars and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6079. 2884

FIREMAN for electric power station having water-tube boilers, mechanical stokers and coal handling plant; good wages to suitable applicant.—State age, experience, wages required, and if eligible for military service, 2887, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FITTER for large Hotel Power Station; experience of Belliss and Turbines. Wages 70s. per week. Permanent job for good man.—2910, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FITTER wanted for generating station, having high-speed reciprocating engines, turbine alternator, and shell-type boilers. Salary 11d. per hour, plus 23s. 6d., plus 12½%, and use of small cottage at nominal rental.—Apply, giving all particulars of experience, to RESIDENT ENGINEER, The Woking Electric Supply Co., Ltd., Board School Road, Woking. 2912

FOREMAN, electrical control gear.—Wanted by large electrical firm in Manchester district, a first-class practical man to take full charge of department on heavy control gear for steel works, &c. Only those with successful record in similar capacity need apply. No one already on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, stating age, experience in full and salary required, mentioning No. A6186. 2892

IMPROVER wanted in a 3-wire D.C. electricity works. Excellent opportunity.—Apply, stating age, training and wages expected, 2789, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

IMPROVER wanted to train for Shift Engineer in D.C. station in Midlands; no night shift. Good wages and prospects.—2957, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

INSTRUMENT Makers, Tool Makers, and Setters wanted for urgent Government work; also Floor Inspector. Must be first-class men. No person resident more than 10 miles away, or already on Government work, will be engaged.—Address FULLER ACCUMULATOR Co., LTD., Grove Road, Chadwell Heath. 2744

LADY required to take charge of electrical fittings shrowroom. No person resident more than 10 miles away, or already on Government work, will be engaged.—2919, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

MANAGER, Winding Department. — Thoroughly trained Engineer, experienced in small and medium sizes Motors, able to work out windings (D.C. and A.C.). Applicant should detail experience, and state salary required. No person resident more than 10 miles away, or already on Government work, will be engaged.—2922, ELECTRICAL REVIEW, 4 Ludgate Hill, London.

MATHEMATICS.—Wanted, full time Instructor, one having a knowledge of electrical matters preferred, for classes of discharged sailors and soldiers.—Apply, stating age, qualification, any previous experience, accompanied by copies of two recent testimonials, to W. A. HARWOOD, Principal, Technical Institute, Gladstone Road, Wimbledon, S.W. 19. 5738

OLD-established firm of electrical engineers, handling every class of insulation for electrical manufacturers, and tramway, railway and general engineering supplies, are open to consider applications for position of Resident Representative for Manchester and district. Salary only or salary and commission. Applicants must have good connection and be prepared to systematically work the whole district.—Applications, giving fullest particulars, to 2907, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REPRESENTATIVE required for North England, Scotland, and Ireland, with connections and experience. Suitable terms to good man. No person resident more than 10 miles away, or already on Government work, will be engaged.—5712, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED immediately, two or three experienced Electricians, used to D.C. motors and installation work, conduit wiring and telephones. No person already on Government work can be engaged. —Apply your nearest EMPLOYMENT EXCHANGE, giving age and references, quoting No. A6185. 2893

ROLLING Stock Superintendent wanted. Previous experience in upkeep and repair of electric cars essential, and preferably with generating station experience. Commencing salary £2 15s., plus war bonus 25s., per week.—THE CHATHAM AND DISTRICT LIGHT RAILWAYS Co., Luton Road, Chatham. 2834

SHIFT Engineer for A.C. Turbine Station near London. Permanency if suitable. Salary £200 inclusive.—Apply, with testimonials, to 2924, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHIFT Engineer required for certified undertaking engaged on munitions work. Experience on Babcock & Wilcox boilers, turbo-generators and E.H.T. 3-phase supply essential. Salary 65s. (including war bonus) plus 12½ per cent.—Apply, with full particulars of experience, age, &c., to KENT ELECTRIC POWER Co., Railway Street, Chatham. 2925

SHIFT Engineer required power station in West of England. E.H.T., 3-phase turbos and mechanically fired. Boiler experience necessary.—Apply immediately, stating age and salary required (permanent appointment), 5776, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHIFT Engineer wanted for three-wire, D.C. station, Diesels; no night shift.—Apply, stating wages required, age and experience, to ENGINEER, Electricity Works, Aberystwyth. 2897

SIX Men required, used to good class switch work; also six Armature Winders. No person resident more than 10 miles away, or already on Government work, will be engaged.—J. STONE AND Co., LTD., Deptford, London, S.E. 2944

SUB-STATION and Switchboard Attendant wanted, E.H.T. and D.C. rotary. London district.—Apply, stating age, experience and wages required, to 5680, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SUB-Station Attendant required; London district; experience with rotary converters and E.H.T. switchgear necessary.—Apply, stating age, details of experience, and wages required, to 2956, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SWITCHBOARD Attendant required, with a view to taking charge of a shift in a generating station.—State age, experience and wages required, to 2783, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SWITCHBOARD Attendant wanted, Lighting and Tramway Station. Possible advancement to shift engineer when proficient. Wages £3 7s. 6d. weekly.—Apply WESTON-SUPER-MARE AND DISTRICT ELECTRIC SUPPLY Co., LTD., Locking Road, Weston-super-Mare. 2917

TECHNICAL Assistant wanted by motor control gear manufacturers in London district. Must be conversant with the details of design and manufacture of all classes of motor control gear. No person on Government work, or living more than 10 miles away, engaged.—Apply, stating age, experience and wages required, to 5772, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TESTER required for switchgear works. The work includes the calibration of circuit-breakers and the testing of starters and controllers. No person already employed on Government work will be engaged.—Apply, giving full particulars and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6080. 2885

TRAMWAY Company in Ireland require good all-round Armature Winder, used to D.K. and B.T.H equipment, repairs and rewinds, and assist on other repairs. Only first-class man need apply.—Apply, stating experience and wages required, 2921, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

WANTED, a Practical Electrician, used to D.C. and A.C. motors. —State wages to THE GOOLE TILLAGE Co., LTD., Goole. 2954

WANTED, Assistant Engineer in small country Supply Station. Good general experience essential, both with plant and distribution. Wages 53s. 6d. per week, plus 12½ per cent. War bonus. Applications, with copies of three testimonials, to be sent to 5806, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Assistant for Apparatus Department of Electrical Engineering Firm in the Midlands. Applicants should have good technical training. Nobody employed on Government work will be engaged. State age, experience and salary required. —Apply to your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. A 6199. 2916

WANTED, by a firm in the S.E. district engaged on munition work, first-class Telegraph Mechanics. No person resident more than 10 miles away, or already employed on Government work, will be engaged. — State age and experience to 6125, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by leading engineering insurance company, Electrical Surveyors, having good knowledge of the theory and practice of alternating and direct current plant. Applicants must be ineligible for the Army or Navy.—2581, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED by leading insurance company, Electrical Engineers, to act as inspectors of electrical machinery; must have experience of A.C. and D.C. machinery and workshop training. Commencing salary £150 per annum, plus £35 war bonus, with increases according to merit; must be ineligible for military service. —State full qualifications, age and experience, 2908, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED by Power Supply Company in London, a Junior Assistant. Must have technical training. Good opportunity to gain up-to-date experience in all branches. Previous experience not essential. — 5683, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED by Supply Company in Scotland, Junior Assistant in Mains Department. Applicants should have experience in testing consumers' installations, and preferably some knowledge of three-phase distribution work. Salary about £175 per annum.— Apply, giving particulars of experience, age, &c., to 2832, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, capable Managing-Engineer in small D.C. three-wire Station 25 miles from London. Gas and oil plant. Salary £220 per annum, inclusive.—Applications, stating experience and earliest date upon which duties could be taken up, accompanied by copies of three testimonials, to be addressed to 5805, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Draughtsman for Switchgear Department of Electrical Engineering Works in Midlands. Nobody employed on Government work will be engaged. State experience, age, and salary required.—Apply to your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. A 6200. 2915

WANTED, Electrical Fitter for coke ovens and bye-product plant in South Yorkshire. No person already engaged on Government work will be employed.—Apply to the nearest EMPLOYMENT EXCHANGE, mentioning No. A6172. 2879

WANTED first-class Winder, capable of winding A.C. and D.C. Motors. State experience, age and wages required.—Apply POWELL DUFFRYN Co., Bargoed. 2830

WANTED, for India, central station, Engineer with full mechanical knowledge. Ineligible for military service. Commencing £400 per annum.—State experience, Z Y 368, care Deacons, Leadenhall Street, E.C. 3. 5706

WANTED, fully qualified Electrical Meter Repairer.—State age, wage required, in addition to standard bonuses, and enclose references, to CITY ELECTRICAL ENGINEER, Lincoln. 2740

WANTED, General Assistant to Works Manager in an old-established electric lamp factory. Good opening and progressive salary. No person already on Government work will be engaged.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning No. A5667. 2037

WIREMAN for house wiring and general repairs.— Apply, stating wages, experience and references, to SUFFOLK ELECTRICITY SUPPLY Co., Felixstowe. 5775

WIREMAN-Improver (smart), lighting, power. No person resident more than 10 miles away, or already on Government work, will be engaged.—LINDOW, 87, Parkhurst Road, Holloway. 5783

WIREMEN wanted; also good Telephone Repair Hand. No person resident more than 10 miles away, or already on Government work, will be engaged.—Apply F. G. EDEY & Co., LTD., 25, Warwick Lane, Newgate Street, E.C. 5726

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

WIREMEN Wanted; permanency. Electricity Undertaking in the Midlands. Rate 1s. 3d. per hour, including all bonuses.—Reply, stating age and experience, to 2870, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKING Engineer required. to take charge of a shift in a small electric station near London. Experience in similar capacity preferable.—Write, stating age, form of exemption, and wages required, to 2865, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKING Foreman for electrical accessories manufacture, North London; small switches, &c. Good organiser and disciplinarian essential. Permanency for good man.—State age, qualifications and wages required, 5743, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKS Superintendent.—4000-KW., A.C. Station, turbines, reciprocating plant and water-tube boilers. Permanent job. Salary £300 per annum. Must have had experience in similar position.—2923, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

YOUTHS, 16½-17½ years of age, may receive full-day tuition and practice in Wireless Telegraphy; £3 10s. per term of 13 weeks.—Splendid chance of promotion for bright lads.—Apply W. A. HARWOOD, Principal, Technical Institute, Gladstone Road, Wimbledon, S.W. 19. 5739

SITUATIONS WANTED.

ENGINEER AND MANAGER.

ENGINEER (46), Electrical, Mechanical and Commercial, 14 years export manager of large electrical company's large trade connections, contracts, sales, good negotiator and linguist, valuable foreign and colonial experience, first-class references, desires appointment as Manager, in or about London preferred.—E. G. L., 7, Castello Avenue, Putney, S.W. 5744

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

A GENTLEMAN with exceptional experience and technical ability, wants a responsible position with reputed firm manufacturing electrical instruments, meters, or signalling-gear, &c. Excellent testimonials.—5678, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER desires change to London district, as Shift Engineer, experience with three-wire systems and Diesel engines. State wage offered.—5702, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, good all-round Electrician, 20 years' experience collieries, power station and works, desires responsible position; disengaged shortly; good references.—5769, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Engineer, at present employed on the commercial side of an electrical undertaking, desires position as Representative or Agent.—5804, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Engineer, Mechanical and Electrical, with first-class theoretical and practical experience, contemplates change. Accustomed to running and management of large electrical plants. Capable organiser and experienced in the management of men.—5674, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Engineer (young), final Army discharge, with four years' Technical College Diploma, experience of technical, manufacturing works, drawing office, power houses, mains. London district preferred.—5787, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CAR Painter seeks permanency on Tramways. Good all-round man; 20 years' experience on car work. Highest testimonials.—5757, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer, desires permanent post. 16 years' sound experience A.C. and D.C., &c.; free November 8th.—Mr. B., c/o Baldwin, 47, Cliffe Street, Keighley, Yorkshire. 5716

DISCHARGED Army Officer (26), single, requires responsible post with manufacturing electrical engineering firm or other of high repute. Fully conversant with electrical matter, including Government contracts, having secured highest and varied experience with large engineers in London. Prepared to act as assistant to secretary, or would consider responsible position where electrical commercial experience can be utilised to the best advantage. Highly ambitious and truly energetic.—5760, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Cable Works Manager and Engineer, 16 years' experience in the manufacture of all classes and grades of cable, desires similar position with reliable firm desirous of getting maximum output at lowest cost.—5774, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

ELECTRICAL and Mechanical Engineer, qualified, requires post in Australia or Colonies. Complete equipment and installation of works or factory plant, maintenance and management; A.C. and D.C. machinery.—5765, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and mechanical Engineer (25), with good theoretical and practical training and good knowledge of power station works, seeks responsible post.—5782, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer desires post as Inspector; fully qualified both technically and practically and holding degrees in engineering. Discharged from the Army.—5778, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer seeks administrative position. Wide experience on erection and maintenance of power stations, batteries, works electrification, designing, estimating; good organiser and administrator.—5657, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, with technical, practical and commercial training, requires situation as contractor, manager, or similar appointment; 18 years' experience in estimating, control of men, interviewing, &c.—5803, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN, D.C. experience, seeks engagement West of England. Ineligible.—R. ROBERT, 39, Kensington Road, Weston-super-Mare. 5701

ELECTRICIAN, experienced all systems, ineligible, wants job; Government work preferred; full London rate.—"ELECTRICIAN," 174, Newmarket Road, Cambridge. 5768

ELECTRICIAN (Foreman), disengaged shortly, desires situation in shipyard or otherwise. Experienced shipyards (full charge), steel works, Admiralty work, electric welding, &c.; some commercial and drawing office experience.—5768, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN requires job to carry out new work only; charge preferred. Over age.—MATTHEWS, 24, Thornhill Square, Camberwell, S.E. 5. 5644

ELECTRICIAN requires maintenance of large building; telephones, bells, motors.—5761, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN wants situation (permanency); state wages.—E. C., 35, Valentine's Road, Ilford. 5763

ELECTRICIAN (24), theoretical, practical experience, seeks charge country house plant; gas or oil engines; army rejection final.—"ELECTRICIAN," 3, Malcolm Road, Woodside, S.E. 25. 5801

ELECTRICIAN-Mechanic seeks situation; factory maintenance, estate engineer, or offer.—BRAY, 180, Finborough Road, S.W. 10. 5791

ELECTRICIAN-Wireman, long experience all branches, ship work, &c.; late charge.—W., 113, Albert Street, N.W. 1. 5767

ELECTRICIAN'S Assistant seeks light situation; age 17.—"ELECTRICIAN'S ASSISTANT," 106, Chrisp Street, Poplar. 5800

ELECTRO-PLATER, ineligible, with wide practical experience, seeks situation.—W. G. ANDREWS, 50, Aberdeen Road, Edmonton. 5789

ENGINEER, A.M.I.E.E. (discharged), desires permanent responsible position in London; 21 years' first-class experience. Accustomed to management of men, supervision of erection and running plant, installations, office routine and estimating.—5786, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER-Electrician (47) seeks responsible post. Experienced erecting and maintenance of all classes of plant. Good mechanic. References.—A. GOING, 49, Rosedale Road, Forest Gate, E. 7. 5732

ENGINEER-Millwright shortly disengaged. A thorough all-round practical man, doing all own erecting, own repairs, both electrical and mechanical; 22 years' experience in charge of large works. Salary £6 weekly.—"ENGINEER," 64, Longfield Street, Wandsworth, S.W. 5662

MANAGER or Foreman. Thorough experience in all branches, power, house and factory wiring, general estimating, &c.—5756, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

METER Inspector (29), ineligible, seven years' Wolverhampton Corporation, desires change. Experience, installations, inspection of apparatus, consumers' queries, central station, A.C. and D.C., switchboard.—5717, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ORGANIZING and Methods Engineer seeks similar position. Good references.—5643, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

SITUATIONS WANTED.—*Continued.*

SOLE Charge of works plant is required by thoroughly competent Electrical Engineer, who is also a most capable Millwright; London preferred; discharged service. Salary £312.—5750, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TRACTION Engineer, just discharged through wounds, requires responsible position in London or suburbs; 15 years' experience in erection and maintenance of electrical car equipment. Good experience in organising and controlling large staff.—5784, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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YOUTH (age 16) desires situation; technical education.—TEELE, 8, Hamilton House, Bishopsgate. 5762

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PARTNERSHIP (active) required after the war by an experienced Electrical and Mechanical Engineer, University graduate, A.M.I.Mech.E., A.M.I.E.E., in an electrical and mechanical consulting firm, or would consider an opening in an established manufacturing firm. Capital available. Not farther North than Manchester. Principals only; no agents.—Reply in confidence to 5639, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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AGENCIES wanted by fully-qualified Engineer for high-class electrical and general engineering supplies, machinery, &c. Excellent business connection and references. State particulars. 5759, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR SALE.

STOCKS OF ELECTRICAL ACCESSORIES AND CABLE.

		£	s.	d.	
15 gross	S.C. Batten Holders, Jap.	0	7	3	per doz.
20 „	3-plate Ceiling Roses, Jap. ...	2	8	0	„ gross.
10 „	10-amp. Round Bow Cut-Outs, Jap.	2	6	0	„ „
10 „	9" E.I. Shades, Blue and White ...	0	11	6	„ doz.
5 „	10/15-amp. Hand-Shield Wall Plugs and Sockets	1	19	6	„ „
6 „	Plain Batten Holders, English ...	0	9	0	„ „
2 „	Oxy.-Copper S.C. Holders, English	0	9	6	„ „
122 „	14/36s S.V. Maroon Cotton Flexible	1	3	0	„ gr. yds.
163 „	14/36s S.V. Workshop	1	3	0	„ „
2¼ cwt.	¼" Rubber Strip, Para	0	7	0	„ lb.
58 miles	1/18s, 600 meg. English Cable ...	10	15	0	„ mile.
59 „	3/22s „ „ „ ...	11	15	0	„ „
68 „	3/20s „ „ „ ...	15	10	0	„ „
8 „	7/22s „ „ „ ...	22	0	0	„ „

This material is offered subject to being unsold, and on the following terms: Free on rail, packing extra. Strictly net cash against invoice.
Only orders for substantial quantities executed at the prices quoted.
2867, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

MACHINERY FOR SALE.

ONE Generating Set Comprising:—
"Howden" Enclosed Compound Engine for 150 lbs. steam pressure, direct-coupled to compound interpole generator, having an output of 300 KW. at 240 volts, 375 r.p.m.; built in 1910, and in first-class order.
Specification and print on request.
THE PHŒNIX ELECTRICAL CO.,
32—36, Broomielaw, Glasgow. 1943

MOTORS AND FUSE BOARDS.

40-H.P., D.C. Motor, 500 volts, with back gear 5 to 1 hide pinion wheel, driven pinion silent, with starting panel, D.A. meter and D.P. switch and fuses. Motor and gear new.
Six 10-way D.P., 15 amps. per way, Ironclad Fuse Boards, Home Office pattern, with switches; also six Boards without switches.
Motors, A.C., 2 and 3-phase, also D.C., 220 and 440 volts, from 2 to 50 H.P., with rails, pulley, starting and switchgear with automatic features. Prompt attention and delivery given.
Apply— ROBUST MACHINERY,
62, Bradford Street, Walsall. 2950

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

50-KW. Steam Generating Set, by Scott & Mountain, direct coupled to Generator, 500 volts, 100 amps., 500 revs.
25-KW. Steam Generating Set, two-crank Comp. Engines, direct coupled to two-pole Dynamo, 100 volts, 250 amps., 450 revs.
6·5-KW. Steam Generating Set, by Robey & Co., direct coupled to two-pole Dynamo, 130 volts, 50 amps., 350 revs.
250-KW. Steam Generating Sets, by Willans & Robinson, direct coupled to Clarke, Chapman Dynamo, 115 volts, 435 amps., 470 revs.
No. 3 Four-spindle "Acme" Automatic Screw Machine, for ⅝" bars.
3½" Centres "Lo-Swing" Lathe on 8' bed.
3" × 36" All-geared Head Flat Capstan Lathe, by Jones and Lamson.
Cutting-off Machine, by Carter & Wright, take bars to 5" diam.
6' arm Portable Electric Radial Drilling Machine, by Kendal & Gent, 2½" spindles, self-act feed.
Richards Horizontal Oil Groove or Waving Machine, with self-act traverse head, self-act feed, T-slotted bed, 2' 2" × 2' 3".

CATALOGUE of Stock MACHINERY. 2-3000 LOTS.
Free on Application. Inspection invited.
THOS. W. WARD, LTD., ALBION WORKS,
Tel.: "Forward, Sheffield." SHEFFIELD.

R. H. LONGBOTHAM & CO., LTD., WAKEFIELD,
and at Milburn House, Newcastle-on-Tyne.
Tel.: { 44 Wakefield. / 867 Newcastle. } Telegrams: "Engineer, Wakefield."

FOR SALE.

ONE Parsons Steam Turbo, 1500 KW., 2-phase, 2000 volts, 50 periods.
One Willans-Parsons Steam Turbo Set, 1200 KW., with Alternator, 1200 R.P.M., 200 lbs. to sq. in., 11,000 volts, three-phase, complete with exciter, also condensing plant, air, and circulating water pumps, &c.
One 500-KW. triple-expansion Set, engine by Browett and Lindley, H.P. cyl. 17½", I.P. 25", L.P. 35" × 14" stroke. Single-phase Alternator, by British Westinghouse Co., 2100 volts, complete with exciter, &c.
One 225-KW. Generating-Set, engine tandem comp. type, 300 H.P., with Corliss Valve Gear, &c., B.T.H. Generator, 500 volts, compound wound.
One Surface Condenser, by J. & H. McLaren, capacity 3000 cls. per hour, with circulating pump.
Two Exciters, 180 volts, 80/100 amps., 200 R.P.M. 5277

MODERN 500-KW. GENERATING SET.

COMPRISING

BROWETT, LINDLEY Totally Enclosed Vertical Engine; 19-in. and 36-in. cylinders, by 18-in. stroke. Metallic packings, piston valves, drum governors, fly-wheel and barring gear.

GENERATOR.—Direct coupled, by Lancashire Dynamo Co.; 500/550 volts, 1000/1200 amperes. Compound wound; 240 revs. Tachometer, &c., &c.

Seen as left off work.

THOS. MITCHELL & SONS, LTD.,
Edgar Street,
Bolton.
2598

FOR SALE.

ONE 10-KW. Oil-cooled Transformer, 2,750 to 200 volts, 3-phase, 40 cycles.
One 5-KW. ditto.
Four Single-phase, 40 cycles Ammeters, 0-50 amps.
One Voltmeter, 40 cycles, 0-130 volts.
Three Voltmeters, D.C., 0-120 volts.
One Voltmeter, D.C., 0-260 volts.
One Tower Waggon, 20 ft.
GRAHAM BROS.,
Electrical Engineers.
Middlesbrough. 5736

(Continued on next page.)

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

GENERATING SETS, D.C.

One 300-KW. Belliss-E.C.C., 460/500 volts.
Three 256-KW. Belliss-Siemens, 460/500 volts.
One 220-KW. Willans-A.E.G., 220/230 volts.
One 200-KW. Allen-Parker, 460/500 volts.
One 185-KW. Browett-Lancashire, 460/500 volts.
One 180-KW. Anderson-Mavor 220/230 volts.
One 160-KW. Belliss-G.E.C., 460/500 volts.

TURBO-GENERATORS, D.C. and A.C.

One 1000-KW. A.E.G., 500 volts, 50-cycle, 3-phase, with condensing plant complete, the whole equal to new.
One 500-KW. Parsons Turbo, 460/530 volts, complete with condenser.

GENERATORS OR MOTORS, A.C. AND D.C

One Crompton, 150-H.P., 25-period, 3-phase, slip-ring.
One Westinghouse, 14-H.P., 350/400 volts, 50-period, 3-phase, slip-ring, 940 revs.
One Phœnix, 290-H.P., 460 volts D.C., 400 revs., 3 bearings.
One Westinghouse, 200-KW., 500-volt D.C., 280 revs., single bearing.
Two 54-B.H.P., 460-volt D.C. Rees-Roturbo motors, speed 1450 R.P.M., with Reyrolle tramway type starters.
One 72-KW. Bipolar Compound-wound Generator, by Siemens, 110/120 volts.

All the above are ready for immediate despatch.

Apply FRANK GILMAN, Lightwoods Hill, Birmingham.
Telegrams: "Gilman, Lightwoods, Birmingham." Telephone: 1081 Edgbaston. 2128

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ONE Generating Set, consisting of 12 N.H.P. Loco-type Boiler and Compound Horizontal Steam Engine, by Davey Paxman and Co., direct-coupled to 200-volt, shunt-wound, D.C. Generator, by the Lancashire Dynamo & Motor Co., and a battery of 106 13-plate cells, by Chloride Co.

One 55/60-H.P., D.C. Electric Motor, by Crompton & Co., shunt-wound, 400 volts, 760 R.P.M., carbon brushes, 6-pole type, ring lubricatfon, semi-enclosed, with slide rails, Igranic starter, main switch and two cut-outs.

One 50-H.P., D.C., shunt-wound Electric Motor, by G.E.C., 480 volts, 730 R.P.M., 4-pole type, carbon brushes, ring lubrication, semi-enclosed, with slide rails, starter, main switch and two cut-outs.

One slow-speed, 4-H.P., D.C. Electric Motor, by Vickers, 175 volts, 20 amps., 305 R.P.M., with Sturtevant enclosed starting panel.

STANLEY ENGINEERING CO.,
Bath. 5733

PULLEYS FOR SALE.

	Diameter.		Bore.		Face.		
One	66″	...	6″	...	18″	...	Split.
,,	66″	...	6″	...	9″	...	,,
Two	54″	...	5″	...	11″	...	,,
One	48″	...	5″	...	13″	...	,,
,,	50″	...	4″	...	10½″	...	,,
,,	54″	...	3″	...	6″	...	,,
,,	56″	...	3½″	...	8″	...	,,
,,	56″	...	4″	...	8″	...	,,
,,	56″	...	5″	...	8″	...	,,
,,	56″	...	4″	...	11″	...	,,
,,	60″	...	4″	...	11″	...	,,
Two	63″	...	5″	...	13″	...	Solid.
One	36″	...	4¼″	...	11″	...	,,

5777, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

STEAM ALTERNATOR.

THE ROCHDALE CORPORATION ELECTRICITY COMMITTEE offer for Sale the following Plant:—

One Belliss-Morcom-B.T.H. Co., 220-KW., three-phase, 3000-volt, 50-period Steam Alternator.

The Plant is in good working condition and can be seen by appointment by applying to Mr. F. H. RUDD, Engineer and Manager, Electricity Works, Dane Street, Rochdale, from whom further particulars can also be obtained.

The Committee do not bind themselves to accept the highest or any Tender. Same endorsed "Electrical Plant" should be forwarded to—

W. H. HICKSON,
Town Clerk.
Town Hall, Rochdale. 2918

ELECTRICAL PLANT FOR SALE.

ONE 300-KW., 220/250-volt Generating Set, comprising "Howden" enclosed compound engine, coupled to compound interpole Generator.

One 500-KW., 220/250-volt Generating Set, comprising "Belliss" enclosed compound engine coupled to compound-wound Generator, and complete with condensing plant.

One 450-KW., 500-volt Set, as above, with or without condensing plant.

THE PHŒNIX ELECTRICAL CO.,
32—36, Broomielaw,
Glasgow. 2429

FOR SALE.—*Continued.*

ELECTRIC MOTORS FOR SALE.

D.C. MOTORS.

	H.P.	Volts.	R.P.M.	Winding.	Makers.	Type.
One	25	420	865	Com.	Holmes & Co.	Enc. vent.
,,	20	460/550	800	Shunt	B.T.H.	,,
,,	15	440	800	,,	Royce, Ltd.	,,
,,	15	230	840	,,	,,	,,
,,	8	230	480	Com.	,,	,,
,,	12	200/220	950	Shunt	Lancs. Dynamo	,,
,,	10	460	900	,,	Keighley Elec. Co.	,,
Two	13	420	1000	,,	Mather & Platt	Toty. enc.
One	10	420/140	1000	,,	Electromotors	Enc. vent.
,,	5	440	1250	,,	,,	,,
,,	5	220	1375	,,	General Elec. Co.	,,
Two	4	400	1150/1835	Inter.	,, ,,	,,
One	3	200	1275	Shunt	Deihl Elec. Co.	,,

A.C. MOTORS.

	H.P.	Volts.	R.P.M.	Phase.	Periods.	Makers.	Type.
One	27/30	350/400	720	3	50	Clayton Motors	Slip ring.
,,	12	420	960	3	50	Gen. Elec. Co.	,,
Three	3	420	1450	3	50	Wright & Wood	In. motor
One	5	100	1000	Single	50	,, ,,	,,

Catalogue of Stock Motors, Generators, Gas and Oil Engines free on receipt of request.

YARNALL & CO.,
Cornwall Street Ironworks,
Telephone: OPENSHAW 23. Openshaw,
Telegrams: "YARNALL, OPENSHAW." Manchester. 2913

STEEL GRUB SCREWS.

STEEL Grub Screws for sale, 5 BA., 25 long, $\frac{7}{16}$″ dia., ½″ Whitworth, also various other sizes, without certificate. Reasonable offer for lot entertained.

Apply BIRMINGHAM SUPPLY Co., 3, New Street, Birmingham. 5742

SURPLUS STOCKS.

CONSISTING of C.G. Lampholders, ½″ Lampholders, ¼″ Lampholders, Switch-holders, Wall Plugs, Flat-type Switches, Flat-type Coupled Switches, Switch-plugs, China Counterweights, &c. Prices and particulars on application to—

COZENS & CO.,
Ormond House, Great Trinity Lane, E.C 4. 5779

STEAM DYNAMO AND ECONOMISER.

FOR Sale, 330-KW., 220-volt, 350 R.P.M., Belliss-Jackson, Steam Dynamo, 150 lbs. pressure condensing, compound wound.

160-KW., 220-volt, 380 R.P.M., ditto.

One 160-tube Economiser, by Clay Cross Co.

2914, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

FOR SALE.

250-KW. Belliss-E.C.C. Set, comprising Belliss high-speed, 3-crank, compound engine, direct-coupled to E.C.C. generator, 440/460 volts, D.C., 560 amps., 380 R.P.M., with Körting ejector compound, also spare armature. Can be seen running by appointment.—BURY ELECTRICAL PLANT Co., LTD., Phœnix Street, Bury. 2748

LAMPHOLDERS, LAMPS, &c.

FOR Sale at reasonable prices, from stock, Lampholders, Metal Filament Lamps, Switches, Cables, &c., &c.

DAVIS, 11, Sun Street, E.C. 2. 2780

ELECTRIC DYNAMOS AND MOTORS.

MACHINES always available for Sale or hire.
ARMATURES and FIELD COILS
rewound or repaired without delay.

'Phone: 5773 Holborn. MACDONALD, SYER & CO., LTD., 295, Gray's Inn Road, W.C. 1. 8485

CUNNINGHAM, LIMITED.

SMALL Motors and up to 300 H.P. rewound and repaired.

Estimates free. 171, Edgware Road,
'Phone: "5173 Padd." London, W. 2.

(Continued on next page.)

FOR SALE.—*Continued.*

VERTICAL GAS ENGINES.

FOR SALE.—Five Three-Crank Three-Cylinder Vertical Gas Engines, by British Westinghouse Co., Ltd., direct coupled to 160-KW. 480 to 500-volt D.C. Dynamos.

Two ditto, 130-KW., first-class condition. Can be seen as at work. Immediate delivery can be given.

A., Box 6817, Erwood's Advertising Offices,
30, Fleet Street, London, E.C. 4. 2955

NEW AND SECOND-HAND MOTORS.

NEW and Second-hand Motors always available. Armatures and field coils rewound promptly.

ENTERPRISE MANUFACTURING CO., LTD.,
Gun Street Electrical Works, Bishopsgate, E. 1. 2898

PORTABLE ELECTRIC MOTORS.

TO RUN either A.C. or D.C. Great mechanical strength and simplicity. Size $10\frac{5}{16}'' \times 4\frac{1}{4}''$. Weight 10 lbs. H.P. $\frac{1}{4}$—$\frac{1}{3}$.
Most powerful for size and weight yet designed.
Prices and particulars from the Agent—
W. J. HOBBS,
121, Victoria Street, S.W. 1. 5723

Cheap prepaid Advertisements relating to second-hand goods and specified Articles are inserted under this heading at the rate of One Penny Per Word (minimum 1s.).

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BABCOCK & Wilcox Water-Tube Boiler, 1,530 sq. ft. heating surface, 160 lbs. working pressure, in first-class condition, for immediate delivery from stock.—HARRY H. GARDAM & CO., LTD., Staines. 2826

CARBON and Plumbago Brushes for Dynamos, Motors, Generators, &c., in various sizes and shapes. About 20,000 to be sold cheap.—LAKE, 132, Upper Thames Street, London, E.C. 4. 2792

COMPOUND-Wound G.E.C. Dynamo, 55/80 volts, 30 amperes, in perfect order; £30. G.E.C. Voltmeter, 50, $8\frac{1}{2}''$ dial; as new, £3.—105, Loyd Road, Northampton. 5793

D.C. Motors, 230 v., $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 5, 6, 8, 10, 12, 20 H.P.; Motors, 460 v., 1, $3\frac{1}{2}$, 2, 5, 6, 10, 12, 20, 40, 120 H.P.; Motors, 110 v., $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 4, 5, 6, 7, 8, 10, 11, 15, 20, 25 H.P.—5796, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

D.C. Starters to 150 H.P. in all sizes, Shunt Regulators, Voltmeters, Ammeters, Switchboards, and Panels. $\frac{1}{2}$-H.P., 200-v., single-phase, 100 ~, Motor, £8 15s.; 25 v., 25 a., Dynamo, £11; 50 v., 10 a., Dynamo, £11 10s.; two 230-v. Motor-converters, output 30 a. and 40 a.; 5-H.P. Oil or Petrol Engine. £15.—5797, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DYNAMOS, 200/250 v., 15, 60, 100, 450, 650 amps.; dynamos, 110 v., 18, 26, 30, 40, 50, 60, 70, 80, 90, 100, 125, 520, 920 amps.; several 60/80 v., 60/100 a.—5794, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DYNAMOS, 3000, 1500, 1000 and 750 amperes at 6 volts; also smaller sizes. Apply for lists.—CANNING & Co., Electro-Platers Engineers, Birmingham. 7769

ELECTRIC Fan Boxblade 18", 230 volts D.C., in good condition.—5773, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Motor for sale, 40 H.P., 460 volts, 800 revolutions per minute. Excellent condition. Can be seen running in Birmingham district.—2886, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Motors and Dynamos, Sale or Hire. Always a large stock of nearly new guaranteed machines. Immediate delivery.—ELECTRO-GENERATOR CO., 1A, Shepherd's Bush Road, W. 'Phone: 488 Hammersmith. 5347

FOR Sale, a new Voltmeter on slab, registered 120 volts, dial 7" diam.—Apply G. HENDERSEN, 7, Mead Road, Gravesend. 5718

FOR Sale, at Stephens' Shiphouse, Linthouse, Glasgow, two new Laurence-Scott, F.A. 55/D.C. Motors, protected, compound wound, 30 B.H.P., 500 volts, 640 revs., with pulley and slide rails, and Brook-Hirst B-type starters; never been used, advertisers altering system to A.C. 5749

FOR Sale, capital four-panel white marble Switchboard, for lighting and battery generator, for 113 to 160 volts, 150 amps., for battery regulating, &c.; complete with instruments, by E. C. Co.—EDWARDS & JONES, Engineers, Longton, Stoke-on-Trent. 5741

FOR SALE.—*Continued.*

FOR Sale, Converter or Charging Set, 200 volts, 13·5 amps., 115 volts, 20 amps., with starter, switchboard and connections.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2853

FOR Sale, Double Commutator Generator, 2 × 300 volts, 30 KW., 960 R.P.M., with switchboard.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2935

FOR Sale, Electric Hoist, by Manlove, Alliott, two winding drums, driven by 100-volt, D.C. motor, prompt delivery.—WILLIAMS & SONS, LTD., 37, Queen Victoria Street, London. 2857

FOR Sale, Generating Set, 350 KW., 440 volts, 3-phase, 160 lbs. steam pressure.—2938, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR Sale, Generator, 105 volts, 200 amps., 800 R.P.M., compound. Generator, 140 volts, 40 amps., 1200 R.P.M. Shunt with spare armature.—NEALE & FREUND, LTD., 31, Budge Row, E.C. 4. 2947

FOR Sale, Haslam horizontal independent Surface Condenser, about 4,000 sq. ft. cooling surface, with Worthington circulating pump, &c.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2850

FOR Sale, horizontal, duplex, compound Worthington Pump; capacity about 10,000 gallons per hour.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2958

FOR Sale, large quantity of heavy single and twin Conductor Armoured Cable, good for 500-volt work; also quantity unarmoured ditto.—PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2937

FOR Sale, Motor-Generator by the G.E.C., 500 volts, 225 amps., with two series-wound Boosters, 110 volts, 400 amps., 650 R.P.M.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2855

FOR Sale, Multipolar three-bearing Generator, with double commutator, and designed to give 1000 amperes at 110 volts or 500 amperes at 220 volts, and fitted with six slip-rings to give current at 80 volts, 50 periods, single or 3-phase.—THE PHŒNIX ELECTRICAL Co., 32—36, Broomielaw, Glasgow. 2873

FOR Sale, nearly new, 500-H.P., 460-volt, 150 R.P.M., Compound Interpole Motor, complete with starting gear.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2928

FOR Sale, new Westinghouse Switch Cubicle, suitable for 200-H.P., 400-volt, 50-period three-phase motor.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2932

FOR Sale.—One massive-built Dynamo, by Mavor & Coulson 100/110 volts, 240 amps., speed 900, complete with third bearing and slide rails. The above machine has been running at a mansion, and commutator requires turning up, when it is good for several years' wear; it can also be used as a motor at 105 volts, 800/850 revs. Also with above, heavy slate Switchboard, about 6′ × 4′ 6″, with volt and ampere-meters, 0/150 volts, all switches, automatic cut-out resistances, dynamo leads, &c. Price of the lot, £98.—COOK, 5, Elton Road, Bishopston, Bristol. 2899

FOR SALE, one 20-ampere Switch, D.P., and two S.P. 20-ampere Ironclad Fuses, mounted on board; 27s. 6d. These are as new, having only been in use four months.—COOK, 5, Elton Road, Bishopston, Bristol. 2880

FOR Sale, Second-hand 220-volt, 4-pole Motors: four 5 H.P., three 8 H.P., two 12 H.P., and four 18 H.P., all protected type, moderate speeds.—THE PHŒNIX ELECTRICAL Co., 32—36, Broomielaw, Glasgow. 2872

FOR Sale, six marine-type, dry-back Boilers, 13 ft. × 11 ft., 180 lbs. working pressure. Seen fixed. Immediate delivery.—Box B 440, c/o Dawson's, 121, Cannon Street, E.C. 4. 2851

FOR Sale, seven 20-H.P., 500-volt B.T.H. Tramway Motors, with or without controllers.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2934

FOR Sale, small Steam Set, suitable for ship or factory lighting, 60 volts, 160 amperes, nearly new.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2933

FOR Sale, Surface Condensing Plant for 500-KW. Engine.—THE PHŒNIX ELECTRICAL Co., 32/36, Broomielaw, Glasgow. 2930

FOR Sale, the following lengths of 19/16 V.I.R. Cable Battery Leads with Sockets; just removed from a mansion. One length each 40, 27, 24, 18, $5\frac{1}{2}$ and 5 feet; two lengths each $2\frac{1}{2}$ feet; three lengths $3\frac{1}{2}$ feet. Also the following lengths of lead-covered 19/14 ditto: one length each 25 and 8 feet; two length 6′ 9″ each. Price 10 guineas the lot on rail.—COOK, 5, Elton Road, Bishopston, Bristol. 2894

(Continued on next page.)

FOR SALE.—*Continued.*

FOR Sale, vertical, high-pressure, three-throw Pumps, plungers 7½" × 9" stroke, driven by Steam Engine; prompt delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2858

FOR Sale, 5-H.P., 110-volt, 450-R.P.M., enclosed series-wound Motor, £26; 15-H.P., 400-volt, 50-period, 960-R.P.M., 3-phase Motor and Starter. £65; 25-H.P., 500-volt, 50-period, 960-R.P.M., 3-phase Motor and Starter; also spare Rotor, £125.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 2936

FOR Sale, 5-ton Electric Overhaul Travelling Crane, 38½ ft. span, with three 220-volt, D.C. Motors.—2929, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR Sale, 50 and 150-KW., 220-volt multipolar three-bearing Generators or Motors.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 2931

FOR Sale, 90-KW. modern Generating Set, by Browett, Lindley and Laurence Scott; 220 volts, 410 amps., 450 R.P.M. Engine, compound, developing full load at 160 lb. steam pressure on atmosphere; Generator, 6-pole compound wound; complete with new spare armature, and ready for immediate delivery.—5676, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR Sale, 110-KW. Steam Generating Set, Siemens type dynamo, 220 volts. Immediate delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2854

FOR Sale, 120-H.P. D.C. Motor, by the G.E.C., shunt wound, 500 volts, 650 R.P.M. Now fixed. Immediate delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2852

FOR Sale, 175-KW., Belliss-Parker, direct coupled Steam Set, 420/460 volts, seen fixed.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 2856

FOR Sale, 290-KW. Belliss-Silvertown direct-coupled Generating Set, 600 volts, 490 amps., 350 R.P.M.; Generator 4-pole, shunt-wound; and compound Engine. Complete with spare Armature and Shunt Regulator; enamelled slate Switchboard suitable for above, consisting of generator panel and two feeder panels, with instruments and D.P. circuit-breakers &c. The above plant is in thoroughly good order, open for inspection, and ready for immediate delivery.—83, The Exchange, Cardiff. 5675

GENERATING Plant for Sale, 500 and 900-KW., 500-volt Belliss Sets. Can be seen under load, and delivery can be given in about four weeks.—2927, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

LIMITED number of Flints, Wicks, Springs, and Wheels for petrol lighters guaranteed. Flints 1s. 4d. doz., 14s. gross; wheels 4d. each; wicks 1d. each; springs 1d. each.—OSBORNE, 29, Oberstein Road, Clapham Junction, S.W. 5751

ONE 12-H.P. Langdon-Davies Motor, single phase, 200 volts, 50 periods, with starter and pulley.—5790, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ONE 200-KW. Steam Generating Set for immediate sale, Willans-Mather & Platt, 220 or 440 volts. Perfect working condition.—JENNINGS, West Walls, Newcastle-on-Tyne. 1513

PLATING Dynamos, 50, 100, 200, 1500 amps.—5795, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TELEPHONE Exchange, 48-line, G.E.C. make, perfect condition.—PHOTECTOR, Central Hall, Southall. 5764

TWO 8-H.P. Motors, by Electromotors, Ltd., 480 volts D.C., semi-enclosed, 4-pole, shunt-wound, 1900 R.P.M.; 1 ditto, 7 H.P., by Electromotors, Ltd., 2365 R.P.M.—WESTERN ENGINEERING COMPANY, Swansea. 2943

VACUUM Cleaner, cabinet type, 200 volts, 50 periods, A.C. Also Blower, 2 in. outlet, direct coupled to 200/230-volt D.C. motor; both in excellent condition.—DAVIS, 39, Flora Street, Plymouth. 5766

1-KW. Motor-Generator, 480/110 volts, by E.C.C., direct coupled on bedplate.—DRUMMOND & CO., Middlesbrough. 5694

5-H.P. Gardner Vertical Paraffin Engine, complete with feed and water tank, vaporiser carburetter, fitted with H.T. Bosch watertight magneto, ready for work, and in new condition, £54.—A. RUSHWORTH, Chigwell Row, Essex. 5640

6-H.P., 460-volt Crane or Hoist Motor, totally enclosed with B.T.H. controller and circuit-breaker; as new.—DRUMMOND AND CO., Middlesbrough. 5695

6-INCH Gwynne Centrifugal Pump, direct coupled to 17-H.P., 460-volt, shunt, Westinghouse Motor, with control panel, only used short while, condition perfect.—DRUMMOND & CO., Middlesbrough. 5690

FOR SALE.—*Continued.*

6½ H.P., 200 volts, 550 R.P.M., shunt-wound, B.T.H., very little used; also 3 H.P., 2 H.P., 1 H.P., Adnil's, 200 volts.—LOCKETT & CO., Dean Street, Fetter Lane, E.C. 4. 5754

12½-H.P. Westinghouse Motor, 220 volts D.C., series wound. 760 R.P.M.—WESTERN ENGINEERING COMPANY, Swansea. 2942

12½-KW. Steam-driven Belliss-Westinghouse, 120-volt, D.C. Lighting Set. Immediate delivery; in new condition.—WESTERN ENGINEERING COMPANY, Swansea. 2940

14-B.H.P., Totally-enclosed, Compound-wound Mather & Platt Motor, 230 volts, D.C., 500 R.P.M., with or without magnetic brake of the "post" type. Reversing controller and resistances.—WESTERN ENGINEERING COMPANY, Swansea. 2941

15-B.H.P. Blackstone semi-Diesel crude oil engine, in splendid condition.—PARKINGTON, Newcastle Emlyn. 2901

15-H.P., 460-volt, series wound, protected Motor, by Westinghouse; speed 600. Condition as new.—DRUMMOND & CO., Middlesbrough. 5692

22-KW., 110-volt, 200-amp., multipolar Zone Generator, with pulley and slide rails; just stopped working.—DRUMMOND AND CO., Middlesbrough. 5693

44-KW., 110-volt D.C. Generator, compound wound, three-bearing type, with rope pulley and slide rails; speed 600.—DRUMMOND & CO., Middlesbrough. 5691

100-VOLT "Tricity" Cooker, quite new, £5.—5730, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

150-KW., D.C. Generator, multipolar type, 500 volts, with rope pulley; splendid condition.—HARRY H. GARDAM AND CO., LTD., Staines. 2952

190-H.P., six-pole D.C. Motor, by Ernest Scott & Mountain, 500 volts, arranged for rope drive.—HARRY H. GARDAM AND CO., Ltd., Staines. 2827

8,000 LAMP Tops, metal filament type.—5799, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

20,000 FLAME Arc Carbons, 6 mm. to 12 mm. diameter, 12" to 25¾" long, both metal cored and non-metal cored; also 500 33-mm. 10" cored Carbons; all to be sold cheap.—LAKE, 132, Upper Thames Street, London, E.C. 4. 2793

ARTICLES WANTED.

STOCKS PURCHASED.

STOCKS of Cable, Bell and Lighting Accessories, Lamps, &c., purchased for cash. Large and small quantities.

DOUGLAS, Dunedin House,
Basinghall Avenue, E.C. 4. 2675

METAL FILAMENT LAMPS WANTED.

METAL FILAMENT LAMPS wanted for 30 and 100 volts bayonet cap, 16 to 50 C.P.; preferably pear shape. Needed for export.

THE OVERSEAS ENGINEERING CO., LTD.,
75, Curtain Road, London, E.C. 2. 2815

BATTERIES WANTED.

50 VOLTS wanted for small private house installation; also wiring, switches, and general interior fittings for same.—BLUE BIRD MOTOR CO., LTD., 1, Ebury Mews East, Eccleston Street, London, S.W. 1. (Victoria 3884.) 5686

MOTOR AND GENERATOR.

WANTED, 10-H.P., 460 v., shunt-wound, D.C. Motor; 100 amp., 100-volt, shunt or compound-wound, D.C. Generator.

5788, ELECTRICAL REVIEW.
4, Ludgate Hill, London, E.C. 4.

(*Continued on next page.*)

ARTICLES WANTED.—*Continued.*

STEAM DYNAMO WANTED.

WANTED, price 100 to 130-H.P. 110-volt Combined Set, 160 lbs. pressure.
Price, full particulars, where seen, date made, to
2906, ELECTRICAL REVIEW,
4, Ludgate Hill, London.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.).
Box Number and ELECTRICAL REVIEW address count as seven words.

ACCUMULATORS wanted for refining purposes. Obsolete Generating Sets, Dynamos, Motors, and all kinds of Machinery. Scrap Cable, Arc Lamps, Meters, Metal Residues, and Scrap Metals of every description purchased for prompt cash, town or country.—Apply A. BROWN & SONS, 142, Lower Clapton Road, London, N.E. Telephone: Dalston, 535. Telegrams: Secondhand, Lowclap, London. Established 1860. 4358

A.C. and D.C. Motors (second-hand), any type, any condition, wanted for prompt cash.—A. LEAROYD & SON, Bridge Works, Heatherley Street, Clapton, N.E. 5391

A. LEAROYD & SON, Bridge Works, Clapton, N.E.—Telephone Dalston, 2278; Telegrams: Frangible, Lowclap, London—buys for prompt cash every description of second-hand Generating Sets, Accumulators, Motors, Transformers, old Arc Lamps, Meters, Cable, Scrap Metals, Metallic Drosses, &c., &c. Enquiries solicited. Established over 50 years. 5392

A 1 CASH Prices given for Electric Cable, Flexible Wire, Electrical Accessories, &c.—Apply DAVIS, 11, Sun Street, E.C. 2. 1424

DIRECT Reading Bridge, complete with dead-beat needle galvanometer; new or second-hand.—THE CRESSALL MANUFACTURING CO., 40 and 41, Staniforth Street, Birmingham. 2946

DYNAMO wanted, 110 volts, 40/50 amps., compound wound, D.C. —J. RAWLINSON, 9, Westgate, Burnley. 5802

GENERATOR Switchboard, 100 ampere-meter, 150 voltmeter, main double-pole switch and double-pole fuses, and four circuits, single-pole switch, double-pole fuse.—Particulars and price to BAILEY & WHITE, Portsmouth. 5770

MODERN compound-wound Generator, 230 volts, D.C. (belt driven), 25/35 KW.—Particulars and price, GATLEY & CO., Todmorden. 2737

MOTOR, 1½ H.P., 230 V. D.C.—Make, condition, price, VAUGHAN, Optician, Croydon. 5780

NEW or Second-hand Tubing and Fittings wanted.—WALLACE, 58, High Street, Bloomsbury. 2307

OIL-driven Electric Light Plant wanted, 100 or 50 volts, with battery complete, about 200 to 300 ampere-hours capacity.—5571, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PLATINUM, in any form and quantity, purchased at highest prices by DERBY & CO., LTD., 44, Clerkenwell Road, London.

PLATINUM Scrap purchased in large or small quantities. Highest market value given.—Before selling elsewhere call or post to the old and reliable firm, THE DEPÔT, 156, Charing Cross Road, London. Established 1850. 5648

SURPLUS Stocks Electric Cable, Plant, &c., bought for cash; also scrap cable, dynamos, motors, cells, scrap metals, lamp ends, &c.—LAKE, 132, Upper Thames Street, London, E.C. 5473

WANTED, a Bridge Megger or Megger, 200 volts or more. Must be in thorough order.—Full particulars to SOPWITH AVIATION CO., LTD., Kingston-on-Thames. 2951

WANTED, a direct-current Testing Dynamo, about 5 KW., arranged to give the usual standard voltages up to about 600 volts by speed and field regulation. A machine only partially complying with the above specification would be considered.—2881, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, a few 400-volt, 50-cycle, 3-phase Motors, preferably slip-ring type, 5 to 35 H.P.—8133, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, an Electric Light Installation for 25/30 lights, consisting of dynamo, ample accumulators and all accessories. A 6-H.P. oil engine is already fixed to provide the power.—Full particulars to *Advertiser* Office, Bicester, Oxon. 2876

WANTED, C.C. Generator, compound wound, 66/70 KW., 250 volts, slow belt drive.—Particulars to LIVERPOOL BARYTES CO., Clonakilty, Co. Cork. 5753

WANTED, D.C. Motor, 110 volts, 2 to 4 H.P.—A. DAVEY, Moorland Road, St. Austell. 5713

WANTED, direct-coupled Set, about 50/75 KW., 220 or 440 volts, D.C., preferably the latter. Full details and price must accompany offer.—2828, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARTICLES WANTED.—*Continued.*

WANTED, Dynamo. Power, 50 or 25-volt, 100 to 200 ampere-hours capacity.—H. B., c/o Blair, 11, King Street, Cheapside. 5755

WANTED, Dynamo, 1½ to 2 KW., voltage 70/220, in good condition.—LEWIS, Post Office, Cross Hands, Llannon S.O., South Wales. 5792

WANTED, Electric Cooking and Heating Apparatus, Kettles, Irons, Vacuum Cleaners, all voltages. Also Electric Bells, Lamps and Arc Lamp Carbons, and all classes of Accessories and Flexibles. — Fullest particulars to 2316, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Generating Sets, all sizes, Boilers, Accumulators, Dynamos, &c., for export: also Scrap Cable and Metals, Complete plants purchased.—WILLIAMS & SONS, 37, Queen Victoria Street, London. Telephone: 3938 City. 7000

WANTED, one copy "Electrician," 1917, July 20th.—2738, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Plating Dynamos, 500 to 1500 amps., 4 to 6 volts, 500 to 1500 amps., 15 to 20 volts; also lead-lined Tanks.—Send full particulars and prices to 5727, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, several Private Plants complete.—Apply GEORGE MORRISON, Birley Street, Blackpool. 2903

WANTED, 2-way 5-amp. Switches; bronzed finish preferred. Also Conduit Tubing and 600-megohm Cable.—105, Loyd Road, Northampton. 5771

WANTED, 3 to 7-KW. Generator, for lighting; also 3-H.P. Motor, 220 volts, D.C.—Send full particulars COACH AND HORSES, Hereford. 5725

WANTED, 35/40 H.P. D.C. Motor, shunt wound; speed about 700 R.P.M.; suitable for 460 volts. State price and maker. —2878, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, 100/120-H.P. Gas Engine and Producer Plant.—Particulars and price, Box E.G.36, c/o Dawson's, 121, Cannon Street, E.C. 4. 2960

WANTED, 220 v., 50/100 amp., D.C. Service Meter.—5752, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, 250/300-K.v.a. Alternator, 200 volts, 3-phase, 50 periods, about 330 revs.—5746, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, 300/500-KW. D.C. Generator, 220/240 volts, about 210 revs., for direct coupling.—Box G.C. 30, c/o Dawson's, 121, Cannon Street, E.C. 4. 2959

WE often have enquiries from consumers for second-hand 25-cycle, 3-phase, 440 and 2,200-volt motors. Sellers should send post-card, stating horse-power, age, maker, speed, voltage, squirrel or slip ring, pulley diameter and width, and best price, f.o.r.—MOTOR DEPARTMENT, South Wales Electrical Power Co., Royal Chambers, Park Place, Cardiff. 4624

½-H.P., 110-volt, D.C. Motor and Starter; 15 B.H.P. (or thereabouts) complete suction Gas Engine and Plant; also 1" rotary Pump.—Offers to PARKINGTON, Newcastle-Emlyn. 2900

10 H.P. 530-volt Shunt Motor, with pulley, rails and starter.—Full details, price, and where seen to BUCHANAN & CURWEN, 66, Victoria Street, Westminster. 5737

25-B.H.P. Motor, 220 volts, D.C., for belt drive.—State speed. —F. B. HELLON, 57, Moorfields, Liverpool. 5740

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WAR WORK WANTED.

VARNISH MANUFACTURERS producing Insulating, Synthetic and other Varnishes can accept orders for war work, and can execute with despatch.

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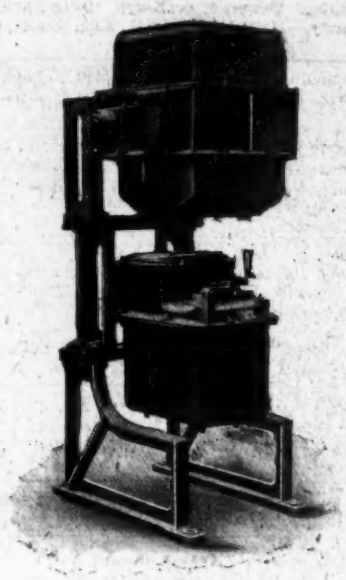
Belfield Old Road, Rochdale. 5603

MANUFACTURING RIGHTS WANTED.

ENGINEERING FIRM with up-to-date plant and special facilities for turning out repetition work are prepared to consider the manufacturing rights of patented specialities for sale amongst tramway and electrical undertakings.—5745, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

Where Advertisements are to be answered to a given Number at the ELECTRICAL REVIEW Office Applications for Names and Addresses of the Advertisers will be entirely disregarded, and Letters giving incorrect Box Numbers will be destroyed.



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We are in a position to give ***QUICK DELIVERIES*** *of our "type D" loose handle oil switches for any pressure up to 6600 volts.*

We can supply them with either ***Watertight, Flame-proof*** *or* ***Explosion-proof*** *Casings for wall or floor fixing; and with or without* ***Draw-out Isolating Features.*** *The switches may be supplied singly or as complete Switchboards with bus-bar chamber, etc., or they may be combined with our Drum Type Starters on a Motor Control Panel.*

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BIRMINGHAM, CARLTON HOUSE, HIGH ST. CENTRAL, 7978.
HEAD OFFICE & WORKS:- VAUXHALL WORKS, SOUTH LAMBETH ROAD, LONDON, S.W.8.
Telephone:- BRIXTON, 2475. A.B.C. CODE, 5TH EDITION.
Telegrams- "ELAPPARATUS LAMBE, LONDON."
MANCHESTER, PALATINE BUILDINGS, VICTORIA ST. CITY, 8064.
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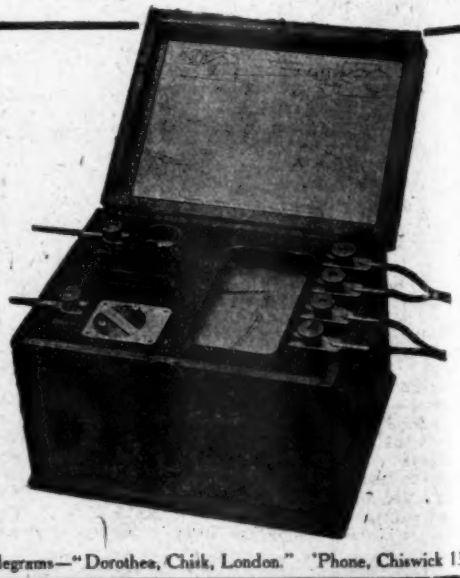

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ACTON LANE WORKS, CHISWICK, LONDON, W. 4.
Telegrams—"Dorothea, Chisk, London." 'Phone, Chiswick 1370

NOTICES RELATING TO PATENTS.

Latest time for receiving 9.30 a.m. Thursday.

John E. Raworth,

Queen Anne's Chambers, 28, The Broadway, Westminster, S.W.1. **Chartered Patent Agent.**

OFFICIAL NOTICES.

Latest time for receiving 9.30 a.m. Thursday.

GREAT NORTHERN RAILWAY COMPANY (IRELAND).

Contracts for General Stores.

THE DIRECTORS of the Great Northern Railway Company (Ireland) are prepared to receive Tenders for the Supply of the undermentioned Stores for Six or Twelve Months, from the 1st January, 1919.

	No. of Form.
Axles and Tyres (Steel)	1
Baskets, Brooms, Brushes, Mats, and Sponges	2
Bolts and Nuts, Studs, Pins, Rivets, and Washers	3
Boxes, Farm and Market Produce	4
Brass and Copper Sheets, Plates, Tubes, and Wire, Block Tin, Zinc, Spelter, and Patent Metal	5
Buckets, Oil Cans, Zinc Sheets, Galvanized Iron Sheets, Emery, &c.	6
Buffers and Axle Guards for Carriages and Wagons, Wagon Hinges, Barrow Frames, &c.	7
Canvas	8
Castings (Ordinary Iron), Firebars, Forgings, Crucibles, Cylinders and Buffer Stops	9
Cement, Plaster of Paris, Slates, Glazed Ware Pipes, Fire Bricks, Tiles, &c.	10
Chain	11
Colours, &c. (ground in oil and dry), and Hall's Distemper, Wall Paper, &c.	12
Drysalteries	13
Electrical Fittings, Lamps, &c.	14
Electric Cable and Wire	15
Electric Light Carbons	16
Explosives, Fog Signals, and Carbide of Calcium for Acetylene Gas Lighting	17
Fastenings, Permanent-way	18
Fittings (Brass) for Gas and Water, Gas Burners, Gunmetal Steam Unions, Rain Water Pipes, &c.	19
Gas Mantles	21
Gauges, Steam and Vacuum Brake	22
Glass	23
Hammer, &c., Handles, Barrows, Oak Keys, Loading Boards and Scotches	24
Hinges (Wrought Iron and Brass), Locks and Keys, Hardware (Iron and Brass), Closet Basins and Seats, &c.	25
India-rubber Goods, Loco. Packing, Asbestos, &c.	26
Iron Plates, Bars, Angles, Tees, and Forgings (best Staffordshire and Yorkshire)	27
Lamps (Oil) and Brass Carriage Fittings, Oiler Pads, and Enamelled Iron Plates	28
Lead (ground in oil and dry), Sheet, &c.	29
Leather and Leather Goods, and Balata Belting	30
Nails	31
Oils (Creosote)	32
Oilskin Suits	32A
Oils (Burning, Lubricating, &c.)	33
Plates (Steel Boiler), Steel Forgings, Fish Plate Liners, Cast Steel Engine and Tender Wheel Centres, Roof Bars, and Mild Steel Plates, Bars, Angles, Tees, and Channels	34
Rope, Twine, Flax, and Hemp Gaskin	35
Screws (Iron and Brass), Split Pins, &c.	36
Signalling Materials	37
Springs for Engines, Carriages, Wagons, &c.	38
Tin Plates	39
Timber, White American Oak Scantlings, St. John's Spruce Plank, Logs, Planks, Boards, Mouldings, Sheetings, &c.	40
Transfers (Carriage, &c.)	41
Tools (Edge), Saws, Files, Tool Steel, Carriage Keys, Hammers, Shovels, Spades, &c.	42
Tubes and Fittings (Iron), Wire, Wire Work, Panel Pins, Staples, and Point Rodding	43
Tubes (Steel—Galvanised), Cold Drawn Weldless for Boilers	44
Upholstery for Carriages, Curled Hair, Blinds, Rugs, Linoleums, Tape, and Soft Goods	45
Varnishes, Enamel, Black Lacquer, and Sheet Dressing Composition	46
Waste (Cotton), Wick, Sponge Cloths, &c.	47

Forms of Tender can be obtained from the SECRETARY on payment of One Shilling for each form. Please do not send stamps.

Tenders must be for the supply of Goods in accordance with the Company's patterns; these patterns may be seen at the General Stores Depôt, Dundalk (they cannot be sent away for inspection), between the hours of 10 a.m. and 4 p.m. on each week day except Saturdays.

Tenders made out on the Company's Forms, should be delivered, under sealed cover, endorsed "Tender for Stores," to the undersigned, not later than 10 a.m. on the 7th NOVEMBER, 1918.

The Directors do not bind themselves to accept the lowest or any Tender.

T. MORRISON, *Secretary.*

Secretary's Office,
Amiens Street Terminus,
Dublin, 10th *October*, 1918. 2882

OFFICIAL NOTICES—*Continued.*

TENDERS.

THE COMMISSIONERS of His Majesty's Works, &c., are prepared to receive Tenders before 11 a.m., on FRIDAY, the 25th OCTOBER, 1918, addressed to THE SECRETARY, H.M. Office of Works, &c., Storey's Gate, Westminster, London, S.W. 1, for the supply of Electric Cable.

Forms of Tender, &c., may be obtained on application to The Controller of Supplies, H.M. Office of Works, &c., King Charles Street, Westminster, London, S.W. 1. 2909

EDUCATIONAL NOTICES.

Latest time for receiving, 9.30 a.m. Thursday.

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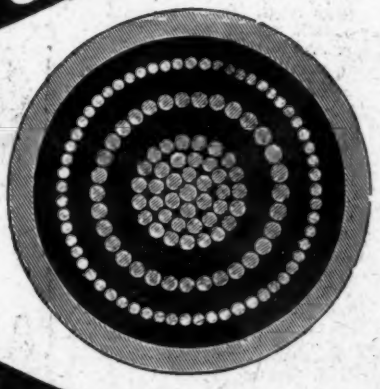

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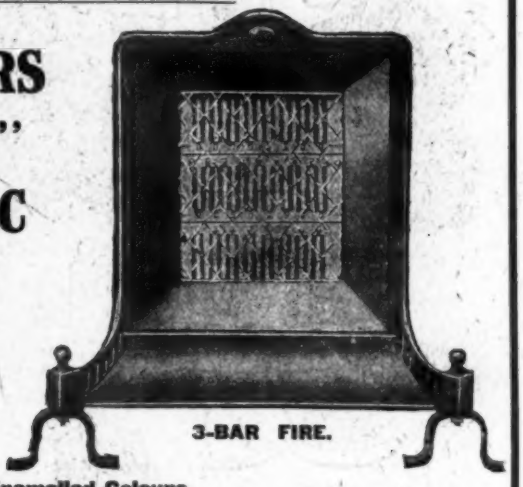

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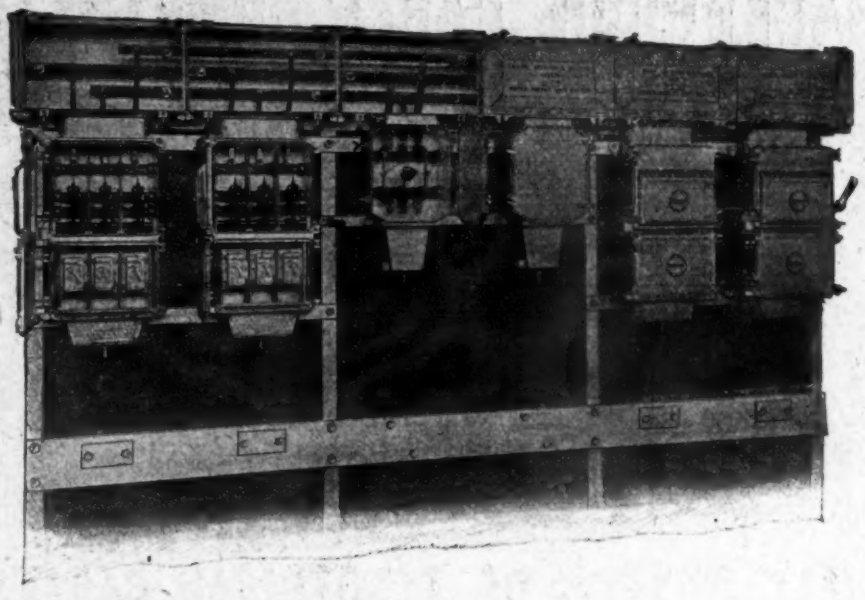

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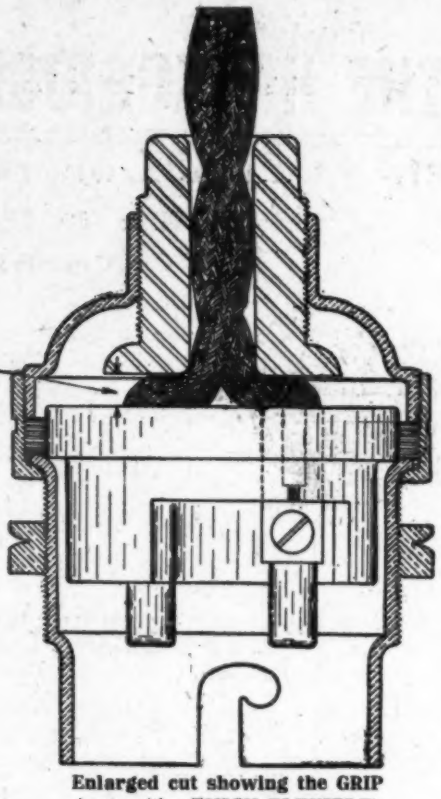

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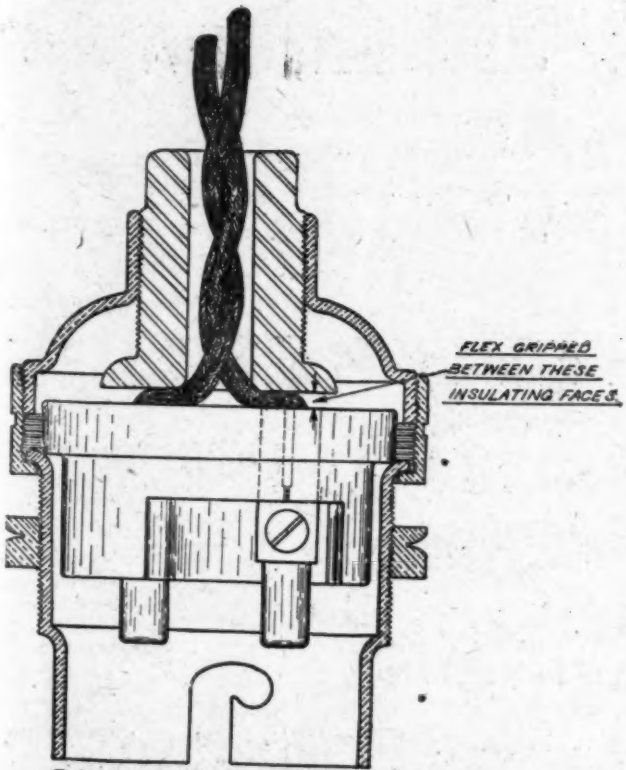

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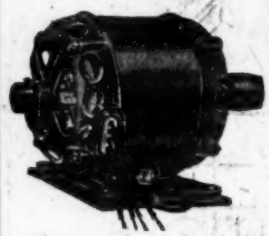

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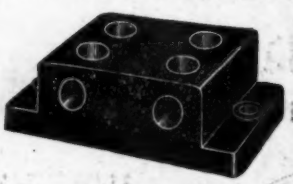

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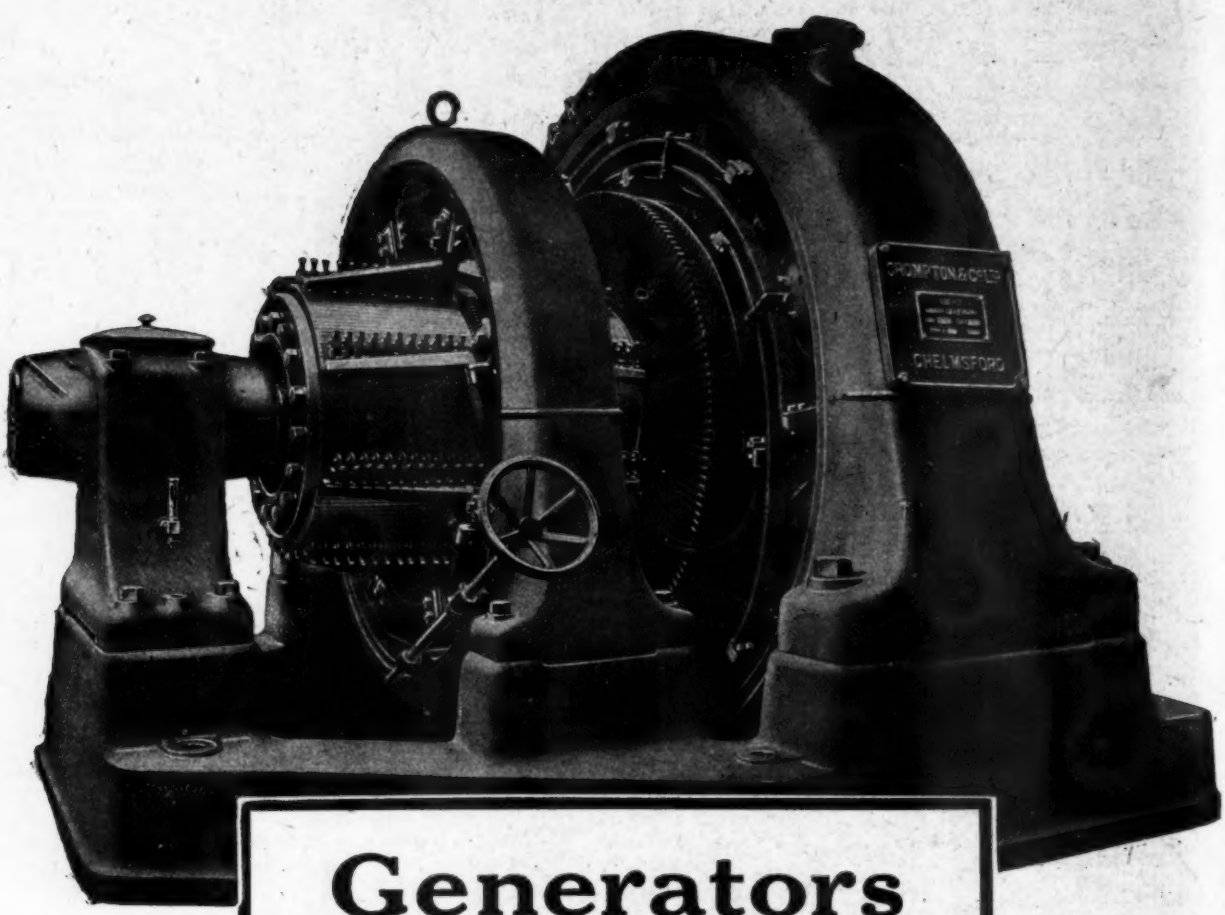

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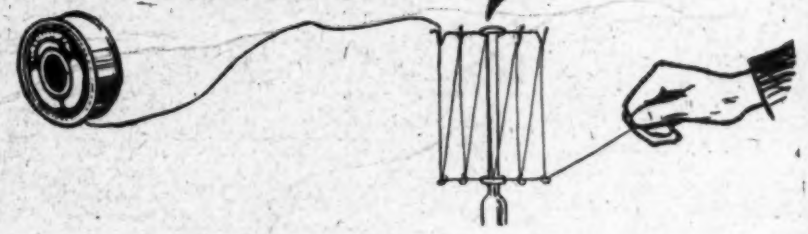

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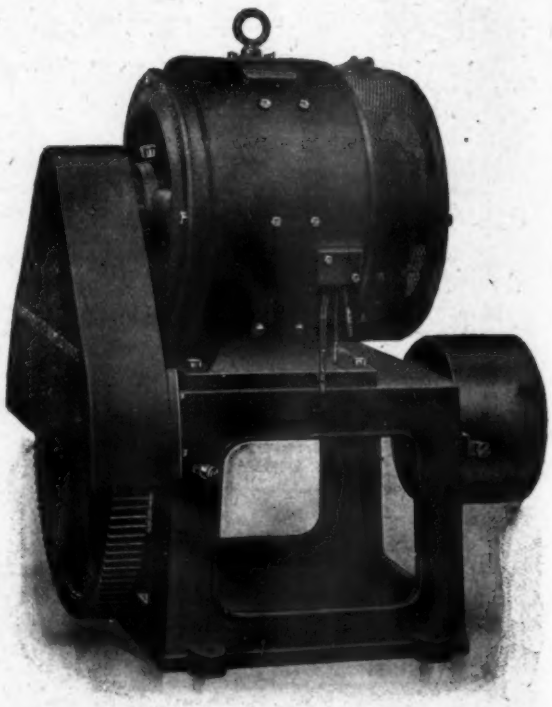

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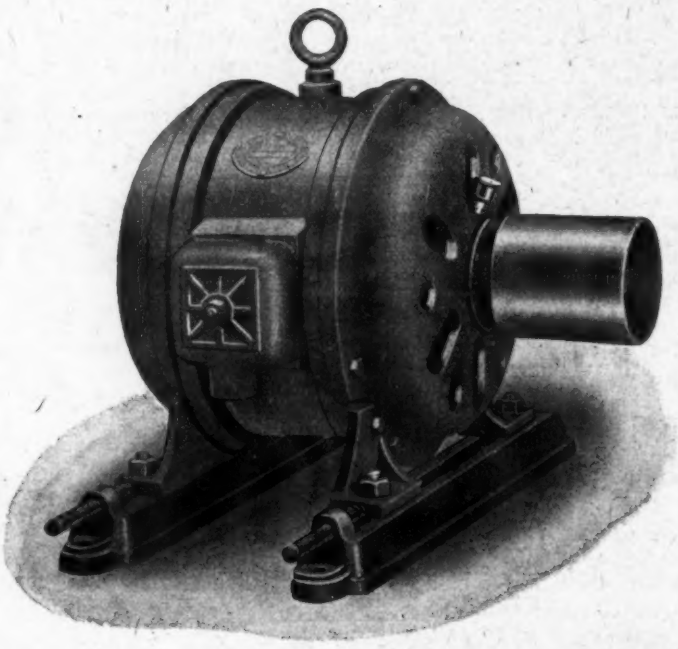

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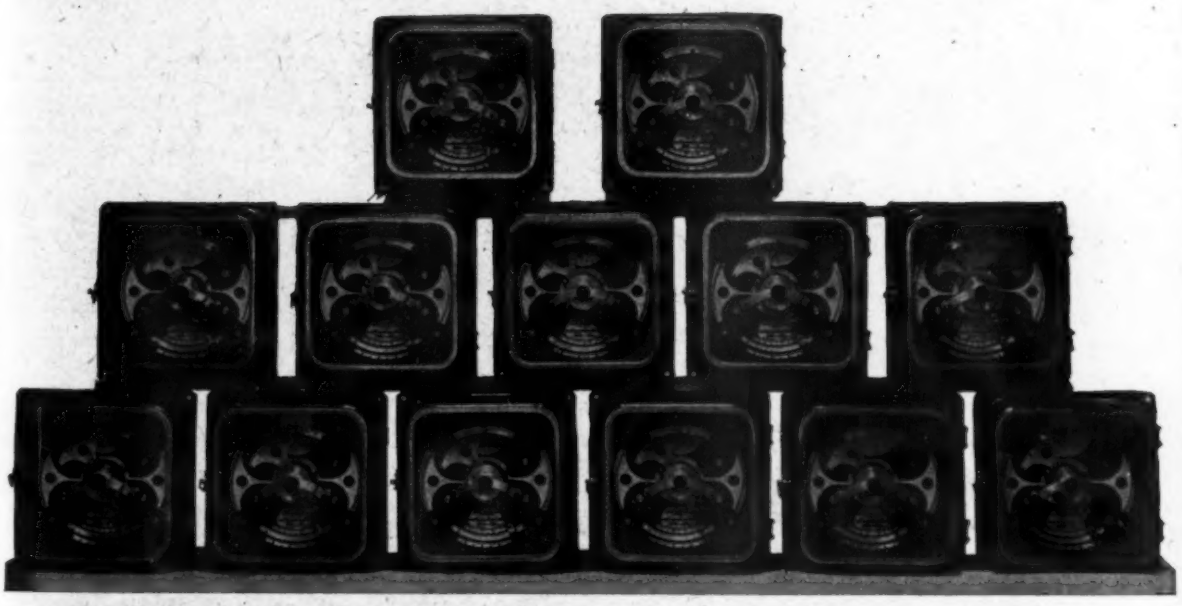


Part of an order for Automatic Pressure Regulator Equipments for the Victorian State Railways.

BROWN, BOVERI & CO., LIMITED, 9, OLD QUEEN ST., WESTMINSTER, S.W. 1

CONTROL
IGRANIC
ELECTRIC
DEVICES

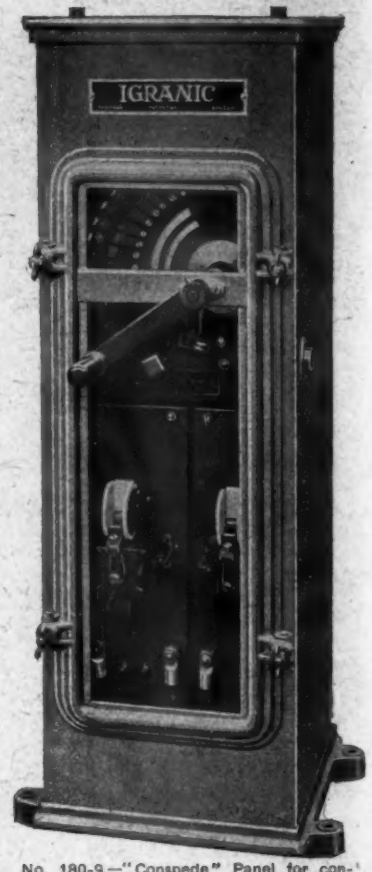
These three MOTOR CONTROL PANELS

represent the highest development of manually-operated switchgear for the control of all kinds of electrically-driven machines.

THEY are the result of a quarter of a century of manufacturing experience.

NO other starting panels possess all their unique protective features, yet their construction is simple and without complication. They include everything necessary and nothing superfluous.

"Conspede"
(Patent)



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No. 180-10.—"Varispede" Panel for variable speed motors is a "Conspede" Panel with mistake-proof speed regulator added.

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LIGHTING AND POWER NOTES.

Aberdeen.—Year's Working.—The annual report for the year ending July 31st last, shows an income from the sale of electricity of £97,512, an increase of £25,924; total income, £102,492, an increase of £26,123; total working expenses, £58,448, an increase of £11,233, leaving a gross profit of £44,044, an increase of £14,890; interest on capital, £13,840, an increase of £2,846; instalment to sinking fund, £19,624, an increase of £1,119, leaving a profit for the year of £10,580, an increase of £10,925, which was placed to the reserve fund, which now stands at £49,327. The revenue account increased by £25,924 and capital charges by £2,846. 103 new consumers were added during the year, making the total 3,660. Motors connected increased by 2,826 H.P.; the total now represents 16,855 H.P. The number of heating and cooking utensils hired out was 1,598, an increase of 193. The total units sold numbered 17,408,147, an increase of 3,320,856; private lighting increased by 181,522 units; public lighting by 2,753; power by 2,599,816; tramways by 370,664; and heating and cooking by 166,191. The delay in delivery of the new 5,000-KW. set and its subsequent breakdown shortly after its installation placed the city's supply in danger during the months of February and March. The 3,000-KW. set had to continue to deal with the bulk of the load when very much in want of general repairs at the time of the breakdown. The shortage of boilers to steam the older and uneconomical generating plant was a further source of weakness. A bad breakdown on a 750-KW. engine, just before the 5,000-KW. set was again in commission, added to the difficulties of supply. With the exception of two days, when large consumers arranged to use half their normal load, and the reduction of one large consumer over the morning and evening peak loads for about a month, supply was fully maintained. The 5,000-KW. set was put into commission after repairs on April 9th, and has been practically continuously in use since then. Two new 18,000-lb. boilers were ordered in January, and are now in course of erection. A further 5,000-KW. generating set is now on order for delivery in the spring. To enable this to be installed in the existing engine room, three reciprocating sets of 420 KW. each have been sold.

Ashton-under-Lyne.—Wages.—The wages of semi and unskilled employés have been increased by 20s. and 12½ per cent. over pre-war rates by the Electricity Committee.

Australia.—New South Wales.—The Balmain Council has had under consideration the question of taking over the undertaking of the Balmain E.L. and P. Supply Corporation, but, owing to financial difficulties, the proposal has been abandoned. The assets of the concern were estimated at £200,000, which would be nearly doubled when the value of the goodwill was added.

E.L. Schemes.—The municipal authorities of Gulgong and Glen Innes (N.S.W.) are seeking authority to install E.L. undertakings within their areas. The Ithaca (Q.) Council has requested the city engineer and the consulting engineer to report upon the E.L. schemes before the Council. The Murwillumbah (N.S.W.) Council has accepted tenders for the supply of plant for the new electricity works, at a cost of £7,026. Tenders have been invited for the supply of equipment required for the proposed power stations at Harden and Murrumburrah (N.S.W.).—*Tenders.*

Electrolytic Zinc.—The plant of the Amalgamated Zinc Co. for the production of electrolytic zinc, at Risden, is turning out about 10 tons of zinc per day, with the use of a little more than half the power expected to furnish that output. Owing to the difficulty of securing the necessary machinery, the Hydro-Electric Department, so far, has been unable to supply the company with 2,500 H.P. in place of 4,000 H.P. which was considered necessary to operate the 10-ton plant, which forms the first unit of the works. The company proposes to use eventually about 30,000 H.P. in the production of zinc, and subsidiary metal-working industries which it is hoped to establish.—*Sydney Herald.*

Sydney.—As the demand for electricity has proved greater than the supply generated at the municipal power stations, the supply to certain districts is now cut off for periods of from a quarter of an hour to an hour and-a-half each day.

Barnes.—Extensions.—The Lighting Committee reports having received five tenders, ranging from £3,682 to £4,200, for plant in order to meet the increased load for factory purposes. As the plant cannot be secured in time for this winter's load, steps are being taken to restrict the demand for domestic purposes. The Council has agreed to apply to the L.G.B. for sanction to borrow at interest £5,500 for the above extensions.

Subject to the consent of the Ministry of Munitions the U.D.C. has provisionally accepted the tender of the British Thomson-Houston Co. for a 500-K.V.A. rotary converter, complete with transformers and switchgear, at £3,682.

Wages.—A letter from the E.P.E.A., applying for an increase of salary of 20 per cent., plus £90 per annum, for any electrical engineers employed by the Council, has been referred to a Committee.

Barnsley.—Loan Application.—The T.C. has applied to the L.G.B. for sanction to borrow £12,500, for capital expenditure at the electricity works.

Bexhill.—Year's Working.—In his annual report for the year ended March 31st last, the borough electrical engineer states that no mains extensions were carried out during the year, but 51 new consumers were connected, and the units sold increased by 23 per cent. Owing to the armature of the 500-KW. generator burning out last November, the whole of the winter load was carried by the smaller generators, at an extra cost for fuel. The total revenue amounted to £13,471, against £11,745 in the previous year, and the working costs to £7,869, against £6,551. Capital charges were £5,404, leaving a net profit of £197. The coal cost per unit was 1·4d., against 1·35d., and the total cost per unit sold was 5·1d., against 5·7d. The revenue was 5·2d. per unit, against 5·6d.; 619,821 units were sold during the year, against 501,961.

Bolton.—Mains Extensions.—The T.C. has applied to the L.G.B. for sanction to the borrowing of £1,500 for the extension of the mains between the Back-o'-th'-Bank generating station and the Duncan Street sub-station.

Brierfield.—Price Increase.—The Council has decided that the following charges for electricity be made to consumers as from October 1st, 1918:—Lighting, up to 1,000 units per annum, 6d. per unit; between 1,000 and 3,000, 5½d.; between 5,000 and 8,000, 5¼d.; over 8,000, 5d.; power, 3d. per unit for the first hour and 2d. per unit for subsequent hours. The first hour for power purposes represents 36 units per 1-H.P. motor.

Carlisle.—Price Increase.—The T.C. has increased the charges for electricity, except to consumers under agreement, by 25 per cent., making a total increase of 50 per cent. over pre-war rates.

Carnarvon.—Price Increase.—The T.C. has agreed to an application of the National Electric Construction Co. for permission to increase its charges for electricity from 6d. to 7d. per unit; the pre-war rate was 5d. per unit.

Chile.—Government Control.—A decree issued through the Ministry of the Interior declares everything related to permits for the installation of electricity stations, their working and maintenance, to be an exclusive faculty of the President of the Republic, and municipalities are to have no power of intervention in such matters.—*Review of the River Plate.*

Clacton-on-Sea.—Price Increase.—The U.D.C. has increased the price of electricity for lighting to 7d. per unit and for power to 3½d.

Cork.—Wages and Increased Prices.—The dispute between the Cork Electric Lighting Co. and its employés on the question of increased wages, was dealt with in arbitration by Sir Plunkett Barton, who intimated that representation would be made to the B. of T. to enable the company to increase its charges, with a view to meeting the men's demands.

Doncaster.—Prov. Order.—The R.D.C. has agreed to the granting by the B. of T. of a prov. order authorising the Electrical Distribution of Yorkshire to supply electricity for all purposes within the parishes of Cadeby, Conisborough, Denaby, Edlington, Sprotborough, and Warmsworth.

Dover.—Boiler Improvements.—The T.C. has decided to have two boilers at the electricity works fitted with induced-draught apparatus, at an estimated cost of £735 each, so that Kent coal may be used. It is estimated that by one furnace there will be a saving of £630 a year on coal. One apparatus is to be fixed at once, subject to the consent of the Ministry of Munitions, and a loan is to be applied for for the second.

Dublin.—E.L. Charges.—The Corporation has referred to a special meeting the question of an increase in the charges for electricity. It has also decided to borrow, at 5 per cent. interest, such sums as the L.G.B. may certify to be necessary to provide working capital for the electricity undertaking.

Glasgow.—Proposed Restrictions.—The question of effecting economies in the consumption of electricity and gas has been considered at a joint meeting of the Electricity and Gas Committees. Various suggestions were made, and the matter was remitted to a Sub-Committee to bring the proposals to the notice of the persons affected.

Hamilton.—Price Increase.—The T.C. has agreed to an application of Edmundson's Electricity Corporation for an increase of 20 per cent. on electricity charges, making 50 per cent. over pre-war rates.

Lancaster.—Year's Working.—There was a deficit of £655 on the past year's working of the Corporation electricity undertaking. The charges have since been increased by 25 per cent., and the income of the first quarter of the current year shows an increase of £900.

Limerick.—E.L. Charges.—The question of an advance of 50 per cent. on electricity charges has been referred to the law adviser. The Corporation already charges 8d. per unit, and the overdraft on the undertaking amounts to £2,500, against £1,567 last year.

London.—St. Pancras.—The L.C.C. Finance Committee recommends the sanction of the Council to the borrowing of £17,076 by the B.C., for electrical plant, &c.

Newbridge (Co. Kildare).—Proposed E.L.—The T.C. is considering a scheme for the installation of electric light, and it is proposed that the water power of the Liffey should be used for the purpose.

New Zealand.—Water Power.—A conference of representatives of Borough Councils, Industrial and Farmers' Associations, Chambers of Commerce, &c., has formed a league for the promotion of the hydro-electrical development of the North Island. The conference urged the Government to proceed with the work at Mangahao, for which it promised to find the labour, so that the scheme can be completed as soon as machinery is obtainable.

The Mayor of Auckland has received a report from the city electrical engineer dealing with the proposed hydro-electric scheme. The Mayor stated that the cost would be between £1,500,000 and £2,000,000.

Plans of the proposed hydro-electric scheme at Waikaremoana have been completed by Mr. S. C. Hay, and forwarded to Wellington, where estimates will be prepared.—*Tenders.*

Rochester.—Public Lighting.—The street lamps are not lit for six days before, and five days after, full moon, and when lamps are actually lit they are put out by the Corporation between 9.30 p.m. and 10 p.m.

Rotherham.—Cost of New Plant.—The borough electrical engineer has reported that the British Thomson-Houston Co. has applied for an increase of £3,000 on the contract price of the 30,000-kw. set condensing plant, on account of the extra cost incurred through Government awards for increased wages to date. Subject to the consent of the Electricity Committee, it has been arranged to increase the price by £1,500, on condition that no further claim be made against the Corporation in respect of past or future claims with regard to Government awards.

Shepley.—Proposed E.L.—The U.D.C. has decided to raise no objection to the application of the Electrical Distribution of Yorkshire for powers to supply electricity within its area.

Stratford-on-Avon.—Price Increase.—The T.C. has granted permission to the E.L. Co. to increase its charges for electricity to 7½d. per unit for the duration of the war.

South Africa—*The British and South African Export Gazette* states that in the mines and industries of the Transvaal, Cape Province, Orange F.S., and Natal there are in use 782 d.c. generators, of a total capacity of 65,039 kw., and 240 a.c. generators of a total capacity of 255,697 kw.; there are 4,367 d.c. motors, of a total capacity of 85,347 h.p., and 7,377 a.c. motors, totalling 462,848 h.p. Apart from the power generated at the mines, 836,437,817 units were supplied during 1916 by the municipalities and supply companies in the Union. Of the total, 784,847,599 units were a.c., of which 783,689,784 units were used for lighting and power, and 1,157,815 converted to d.c. for use on tramways.

Durban.—Although the Municipality has been unable to obtain all the new plant it requires, enough has been secured to maintain a satisfactory supply. Among the new plant recently installed is a condenser, complete with accessories, and two 500-kw. transformers, for transforming from 6,000 volts, three-phase, to 2,750 volts, two-phase, by the British Westinghouse Co., and a centrifugal type steam feed pump, running at 6,000 r.p.m., by G. & J. Weir. An order for a Curtis turbine has been placed with the B.T.H. Co.

Johannesburg.—The Municipality has increased the charges for electricity by 10 per cent.; the tramway fares have also been increased.

Cape Town.—Owing to the difficulty in obtaining cables, the E.L. Department has prohibited the use of radiators, and will not entertain any fresh applications for the installation of heating or cooking apparatus; additional motors only will be installed, provided the existing cables are not overloaded.

York.—Fuel Consumption.—At a meeting of the T.C., last week, it was stated that, owing to the difficulty of effecting repairs to plant, the coal consumption per unit during the past year increased by 25 per cent., representing 4,000 tons of coal. The repairs have now been completed, and greater economy is expected during the current year.

Windsor.—Extensions.—The R.D.C. has given permission to the Egham and Staines Electricity Co. to lay a main from Bishopgate to Windsor Great Park.

Wolverhampton.—Bulk Supply.—The T.C. has sealed an agreement with the Midland Electric Corporation for Power Distribution for the supply of electricity to the Small Heath and Heath Town pumping stations, for the period of the war and 12 months afterwards.

TRAMWAY AND RAILWAY NOTES.

Australia.—Loan.—The Braybrook Shire Council proposes to borrow £10,000 for tramway developments.

Blackpool.—Tramway Purchase.—The agreement for the purchase of the undertaking of the Blackpool and Fleetwood Tramroad Co. by the Corporation has been signed and sealed by both parties, and awaits the approval of a meeting of the shareholders and debenture-holders of the company, which is called for October 22nd. It is stated that the purchase price to be paid by the Corporation is £278,000, and that the shareholders will receive approximately £18 for each £10 share. It is the intention of the Corporation to promote a Bill in Parliament during the present session for power to acquire and work the undertaking.

Bolton.—Track Renewals.—The Tramways Committee has decided to proceed with the relaying of the track on Chorley Old Road, between Whitecroft Road and the terminus.

Burton-on-Trent.—Extensions.—The T.C. has decided to extend the tramways from the Branstone Road terminus to the Leicester Lane railway bridge, at a cost of about £3,500.

Dundee.—Bulk Supply.—The Dundee, Broughty Ferry and District Tramway Co. is closing down its power station at Monifieth, and in future will take a supply of energy from the Dundee Corporation at 1½d. per unit; the charge per unit for the Corporation tramways is at present 1·6d. The electricity department will benefit in additional revenue to the extent of at least £900 per annum.

Douglas.—Year's Working.—The auditor's report to the T.C. states that the loss on the tramways for the past year was £4,276, compared with a debit balance of £6,671 in the preceding year.

London.—A tramcar ran off the lines near Balham Station on Wednesday morning, last week, and traffic was disorganised for a considerable time.

L.C.C.—During the 11 weeks ended October 2nd, 1918, the total number of passengers carried on the Council's tramways was 136,127,709, an increase of 8,782,748 passengers, as compared with the corresponding weeks of 1917; traffic receipts during that period amounted to £765,412, an increase of £129,998, making a total increase in traffic receipts from April 1st, 1918, of £240,651.

New Zealand.—Electric Vehicles.—The Tramway Board of Christchurch has put in service an electric omnibus to serve as a feeder for one of the tramway extensions. The chassis was imported from America, and is equipped with an Edison battery and a New Zealand-built body.

Reading.—Year's Working.—We regret that, due to an error, the statistics given last week under the above heading were not correct, the order of things being reversed. They should read as follows:—Capital expenditure £231,629, against £230,789; revenue £56,797, against £44,597; expenditure £48,397, against £38,874; leaving a net surplus for the year of £8,400, against £5,723; £4,400 was put to the reserve fund, which now stands at £28,749, and £4,000 went to the relief of rates. The sinking fund stands at £87,293. The passengers carried during the year numbered 13,771,598, an increase of 2,852,065; the units generated were 1,400,960, an increase of 101,992, at a cost per unit of 1·53d., against 1·38d. last year.

Salford.—Year's Working.—The annual report for the year ending March 31st last shows a gross income of £350,102, against £284,444; gross profit, £110,333 against £80,217; net profit, £26,970 against £967; £16,970 was placed to the relief of rates and £10,000 to the depreciation and reserve fund. Working expenses amounted to £220,709; traffic receipts increased by £67,842; passengers carried numbered 65,061,878, an increase of 6,260,008; car-miles run, 5,513,441, giving an average consumption of 1·99 units per car-mile; total units used, 11,008,348. Total length of line worked was nearly 76 miles, and approximately 14½ miles of permanent way was relaid during the year.

TELEGRAPH AND TELEPHONE NOTES.

Automatic Telephony.—During the past five years as many new installations of automatic telephone equipment have been made as were made in the 20 preceding years. In America the invasion of the automatic has been slow, but substantial. In the West particularly the automatic has been favourably received. The most remarkable development, however, has been in the adoption of the private automatic exchange. During the first five months of 1918 over four times as much apparatus has been ordered by manufacturing plants and industrial offices as was ordered during the same period in 1917. In 1917, 150 per cent. more such installations were made than in 1916.—*T. and T. Age.*

Sweden.—The Swedish Telegraph Administration has made representations to the Government with regard to the reorganisation of the radiotelegraph service, especially in the matter of installations on mercantile ships. Hitherto the shipowners have been compelled to apply to the international company—the Société Anonyme de Télégraphie sans Fil, of Brussels—which is said to be the owner of the working rights for Sweden of both the Telefunken and the Marconi systems. The Telegraph Administration considers that the letting-out on hire of ship installations should be taken over by the Administration, and after negotiations with the Elektriska Aktie-Bolaget A.E.G., of Stokholm, which represents the licensee company mentioned, has entered into an agreement for the delivery of 0·5-kw. installations on the Telefunken system for which Swedish shipowners will be invited to subscribe in the same manner as in the case of telephone exchanges. Stations for ocean-going vessels, with plants of from 1 to 2 kw., will be dealt with later.

United States.—According to the *Telegraph and Telephone Age*, the Postmaster-General has prohibited the installation of new telephones and the extension of old services, except where they are imperatively necessary; surveys are being made for a

consolidation of mail and telegraph services, with a view to the cheapening and improvement of the service for the benefit of the public, conflicting private or corporate interests being ignored. A scheme is under preparation for combining Western Union and Postal Telegraph offices, and placing them in Post Office buildings. There is no intention of cheapening or reducing either the mail or the wire service. A Special Committee has been appointed to investigate contracts with railroads and telegraph and telephone companies; an Inter-State Commerce Commission, which commenced inquiries more than a year ago, on August 30th declared that the charges made for private telegraph wire service to bankers, brokers, and industrial concerns were unreasonably low, but the leased wires of railroads and the Press were not affected by the ruling, the Commission holding that these were quasi public services, and not to be classed with strictly commercial business.

CONTRACTS OPEN AND CLOSED.

OPEN.

Australia.—Queensland. November 29th. Electric lifts for the Department of Public Works, Brisbane.—*Industrial Australian and Mining Standard.*

Bedford.—November 13th. Two water-tube boilers, mechanical stokers, and induced-draught plant for the Corporation. See "Official Notices" October 4th.

Dublin.—November 7th. Gt. Northern Railway Co. of Ireland. Six or 12 months' supply of stores, including various electrical items. See "Official Notices" to-day.

Glynneath.—October 22nd. Wiring and fitting Bethel Baptist Chapel and Vestry. Mr. W. Harrett, Central Buildings.

London.—October 25th. H.M. Office of Works. Electric cable. See "Official Notices" to-day.

South Africa.—Johannesburg.—November 27th. Municipal Council. 2,000 copper ribbon bonds, and 2,000 copper solid bonds (Contract No. 424). A copy of the specification can be seen at the Inquiry Office of the Department of Overseas Trade (Development and Intelligence), London.

Warrington.—October 22nd. Water-tube boiler, for the Electricity Department. See "Official Notices" October 4th.

CLOSED.

Australia.—P.M.G.'s Department, Queensland:—

900 yd. paper-insulated rubber-covered conductor cable, 104 pairs, £692; 880 yd. lead-covered paper-insulated conductor cable, £673.—W. T. Henley's Telegraph Works Co., Ltd.

Victorian Railways Department:—

Porcelain insulators, 5½d. each.—Firebrick Insulator & Pottery Co., Pty., Ltd.

Metropolitan Board of Water Supply & Sewerage, Sydney:—

One 75-h.p. electric motor, for use in the plant at Folley Point, for the manufacture of chloride of lime from sea water, £420.—Crompton and Co., Ltd.

—*Tenders.*

Barnsley.—Owing to war conditions the T.C. has allowed Messrs. Babcock & Wilcox, Ltd., to increase their tender for an induced-draught fan for the new boiler, from £294 to £304.

Barnes.—U.D.C. Provisionally accepted:—

British Thomson-Houston Co., Ltd.—500-k.v.a. rotary converter, complete with switchgear and transformers, £3,685.

Bolton.—Tramways Committee. Hadfields, Ltd., points and crossings.

Electricity Committee. Robert Foster, three months' supply of conduit and fittings.

Malvern.—U.D.C. Coal for the electricity works, 600 tons of boiler slack. South Wales & Cannock Chase Coal Co.

Southend.—T.C.—

Edison Accumulators, Ltd.—Two-ton tip wagon for tramway department, £1,942.

W. Ward & Co.—Pump and starter for tramway department, £27.

B. I. & Helsby Cables, Ltd.—One mile 600 yd. trolley wire, 1s. 5½d. per lb.

Stretford.—A paragraph in our last issue was headed "Stratford" instead of *Stretford.*

Wolverhampton.—T.C. Electricity Department:—

Staveley Coal & Iron Co.—Standard straight length water piping, £17 10s. per ton; special piping £27 10s. per ton.

J. Hopkinson & Co., Ltd.—Steam and water valves, £179.

Gibbons Bros., £307, plus 10 per cent. for contingencies.—Traversing conveyor for unloading coal at the G.W.R. siding.

The E.C. has sold a 300-kw. reciprocating set at the destructor works to Mr. F. Gilman, of Birmingham, for £1,150.

FORTHCOMING EVENTS.

Industrial Reconstruction Council.—Tuesday, October 22nd. At 6 p.m. At the Institute of Journalists, Tudor Street, E.C. Conference on "Women in Industry," to be introduced by Miss Lilian Dawson, Secretary of the Fabian Society (Women's Group), and a member of the National Union of Women Workers.

Manchester Association of Engineers.—Saturday, October 26th. At 6.30 p.m. At the Grand Hotel. Paper on "Fuel Oil and its Application," by Mr. J. Butterworth.

NOTES.

The Red Cross Appeal.—We desire to remind all our readers of the great City effort, referred to at some length in our last issue, on behalf of the funds of the British Red Cross Society. The business community is being appealed to for one million pounds, and over three hundred thousand pounds was subscribed down to Monday afternoon last.

The increasing desire inside Germany to bring the war to an end must not be permitted to interfere with the flow of generosity on behalf of our wounded and our men who are prisoners. Indeed, the prevailing situation—bringing Peace in sight, and, perhaps, within our early grasp—ought to promote a desire to place at the disposal of this excellent organisation all the funds needed both now and for a period of 12 months after the war to assist the men who have suffered in order that the Victory might be won. Subscriptions should be sent to Sir Robert Hudson, 83, Pall Mall, S.W. 1, or to Major Lionel M. Rothschild, M.P., who is acting as hon. treasurer of the City appeal.

Volunteer Notes.—Royal Engineers (Vols.), London Army Troops Companies.—Headquarters: Balderton Street, Oxford Street, W. 1.

Corps Orders No. 43, by Lieut.-Colonel C. B. Clay, V.D., Commanding.

Captain of the Week.—Capt. E. G. Fleming.

Next for Duty.—Capt. W. Hynam.

Sunday, October 20th.—Annual musketry course at Pirbright. Parade Waterloo Station, 8.45 a.m. Drill order, with rifles. Mid-day and tea rations to be carried.

Monday, October 21st to Saturday, October 26th.—Drills as usual.

Sunday, October 27th.—Commandant's Parade, at Waterloo Station, 8.45 a.m., for work at Esher. Drill order. Mid-day and tea rations to be carried.

C. Higgins, *Capt.* R.E., *Adjutant.*

A smoking concert will be held on Saturday evening, October 26th, at the Regent Street Polytechnic, at 7.30 p.m., Lieut.-Col. C. B. Clay, V.D., in the chair.

Foreign Trade.—The September Figures.—The official returns of imports and exports during last month contain the following electrical and machinery figures:—

	September, 1918.	*Inc. or dec.*	*9 months*, 1918. *Inc. or dec.*
Imports.	£	£	£
Electrical goods ...	83,348	− 11,195	− 218,926
Machinery	900,318	+ 94,526	+ 1,977,572
Exports.			
Electrical goods ...	190,080	+ 3,081	− 746,409
Machinery	1,183,895	−290,771	− 3,007,558

Economic Proportion of Hydro-Electric and Steam Power.—A paper by F. G. Baum, in the *Journal* of the A.I.E.E. (Vol. 38, No. 9) describes a new method of determining for any power system what proportion of generation should be hydro-electric, and what steam, from the standpoint of economics. A method is outlined for obtaining a curve showing "total cost per kw.-year for hydro-electric and steam power" for any percentage combination of generation. With system load curve, fixed charges on steam and hydro-electric plants, cost of fuel, and other steam energy charges all known quantities, this curve can be readily calculated, and one can see at a glance the limiting economical percentage of steam power for the given conditions.

The King's Fund for the Disabled.—The King's Fund for Disabled Officers and Men of the Navy, Army, and Air Force, opened by his Majesty with a gift of £78,000, is designed by the Minister of Pensions, the Right Hon. John Hodge, to raise a minimum of £3,000,000 to re-establish in civil life those gallant Britons who have fought and suffered for their country and for civilisation. This Fund is wholly apart from any State aid, and is a voluntary monument of the nation's gratitude to our heroes who, disabled as fighters, have now to be re-established in civil occupations. The loss of limbs and other physical disabilities make the battle of life difficult for them, and the King's Fund, which is dealing with some 600 cases a week, provides grants of various sums to enable those who have given so much for us again to start life as contented, self-supporting citizens. Donations will be received gratefully by the Minister of Pensions, Westminster House, London, S.W. 1.

Liftwomen's Wages Award.—At a meeting in the Caxton Hall last week of women lift attendants and electricians in Government offices, it was announced that an award had been issued under which the women lift attendants were to receive the same rate of pay as the men—8d. per hour—and, in addition, the women's war advance of 11s., making a total wage of 43s. for a 48-hour week, as against the present wage of 28s. The award is to be retrospective as from September 1st.—*The Times.*

Shaft and Bearing Currents.—It is well known that under certain conditions local currents may be set up in the shafts and bearings of electrical machinery. These currents may cause pitting of the bearing linings, and if the currents are sufficiently heavy the journals may suffer as well.

In the case of alternating-current machines the actual amount of current may be measured with a good degree of accuracy. A method adopted by the General Electric Co., of Schenectady, N.Y., and explained by Mr. F. Ashton in the *Mechanical World*, involves the use of a current transformer with a core built up of rectangular laminated plates. The core should be provided with two separate windings, as shown in fig. 1, the winding to which the ammeter is connected being the secondary. The ammeter should, of course, be suitable for alternating current. In circuit with the lower winding marked "primary" (having a known number of turns) another alternating-current ammeter should be connected, and this latter winding should be energised from some external current supply, having the same frequency as that for which the machine is designed. This second winding is simply for calibrating purposes, and when the shaft current is being measured, by means of the ammeter in circuit with the other winding, the calibrating or primary winding should be disconnected from the supply, the shaft of the machine then becoming the primary. The rotor should be removed

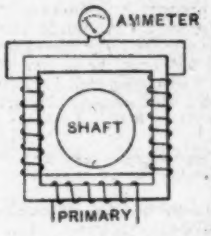

Fig. 1.

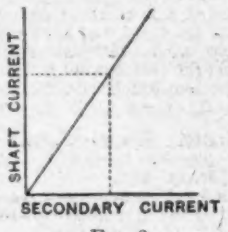

Fig. 2.

from the machine and the transformer threaded over the shaft so that when the rotor is replaced the transformer is situated between the rotor and one of the bearings. By impressing various voltages upon the primary or calibrating coil various currents will be made to circulate in this coil, and if the number of turns on the coil is known, the exciting ampere turns can be calculated by multiplying the current by the number of turns. The exciting values so obtained should be noted together with the corresponding current in the secondary circuit to which the ammeter shown in fig. 1 is connected. Having obtained these values, the primary or calibrating coil should be disconnected from the source of supply, and the shaft of the machine then becomes the primary of the transformer. This primary is obviously composed of only one turn, so that the primary current and primary ampere turns are identical. If a curve be plotted between the readings obtained in the manner described (ampere turns and secondary amperes), it will be possible, if the curve assumes a straight line, to arrive at an average multiplying factor which links the primary ampere turns and secondary amperes, and this factor will, of course, be the ratio of the transformer. But when the alternator is running, the shaft becomes the primary, and by noting the current in the secondary of the transformer the actual shaft current can be arrived at either by multiplying the secondary current by the transformer ratio or by reading it off directly from the curve as shown in fig. 2.

There is no objection to a shaft current, provided that it is confined to the shaft and does not pass into the bearings; hence if brushes are placed at both ends of the shaft, and are either connected to the bearing pedestals or are connected together by a low-resistance copper conductor, bearing troubles will be eliminated. Another and better method of overcoming the difficulty is to completely insulate one or both of the bearing pedestals from the bedplate. This may be done by removing metal shims from under the bearing pedestals and replacing them with thin sheets of fibre. All holding-down bolts must, of course, also be insulated with fibre tubes and fibre washers.

Electric Thermal Storage Heaters.—A summary is given in the June *Bulletin* of the Schweizerischer Elektrotechnischer Verein of the report issued by a committee appointed by the Swiss Electrotechnical Union to deal with heating and cooking apparatus. This communication deals only with electrically heated thermal storage devices for heating individual rooms. The requirements are explained in detail and many data are given relating to the design of such heaters. Common faults in storage heaters now on the market are excessive surface temperature and inadequate storage capacity. The storage media considered are metal, stone, and sand. The committee is conducting certain researches, and expresses its willingness to criticise designs and aid in development work. It is suggested that if the heater imparts all its energy to the room, an input of 30 to 40 watts per cu. m. of room space is sufficient for ordinary winter conditions, and 40 to 60 watts per cu. m. for the coldest weather. It is stated that the complete report gives methods for determining all the characteristics of a thermal storage heater from simple temperature measurements. Most of the heaters built hitherto have been inadequate in dimensions and mass. The heating resistance should be near the centre of the storage material and in good thermal contact with the latter; an intermediate air film results in a steep temperature gradient. It is considered that there is best prospect of obtaining satisfactory results, without spending much time or money on research, by building either stone storage heaters with a core in intimate contact with a heater of chrome nickel or constantan; or heaters with sand as storage medium (in a suitable tile or metal casing), and nichrome or silundum heating elements. Easy replacement of heating element is an important factor.

The Whitley Report.—A correspondent sends us the following Open Letter to Mr. Lloyd George:—

"In view of the recent trouble with railway employés being led by committees in the various centres in direct opposition to the recognised heads of their Unions, may I suggest that whilst the Whitley Report is an excellent proposition it lacks finality?

It is well known that when a committee is appointed by a particular workshop, the ringleader or agitator is to the fore and undoubtedly secures a place on such committee! failing this his occupation is practically gone.

The recent railway trouble, as we all know, was due to the men not abiding by the agreement made by their Union leaders.

I venture to suggest that to the Whitley Report should be added provision for severe punishment by the Government to whoever is responsible for failure to carry out an agreement duly made between the recognised Trade Union officials and another. Such punishment to fall definitely on the Shop Stewards Committee. On that committee shall rest the onus of proving if the fault rests on others than themselves, and only by such proof shall the punishment be transferred from the committee to the actual ringleaders.

Unless something of this kind is put into force industrial peace can never last long; further, it would deter the professional agitator from desiring to get on the Shop Stewards Committee for his own selfish ends, if he knew what awaited him."

"Industrial Peace."

Testing Electric Meters in Germany.—New Regulations have been issued, dated May 22nd, 1918, by the Physikalisch-Technische Reichsanstalt concerning the testing of electric meters, says the *E.T.Z.* of July 4th. A complete measuring device consists of transformers and one or more meters. During the testing of the instruments all auxiliary apparatus (power, current, voltage, indicators, relays, &c.) that are to be actuated by the transformer in practice must be connected into circuit, or replaced by substitute resistances and coils with the correct energy consumption and power-factor. If the secondary leads of a current transformer exceed 0.15 ohm, an equivalent resistance must be inserted during the test. Tests made according to this new regulation are indicated by affixing special name plates to the meters and transformers, the two devices bearing corresponding numbers.

Discharged Men not Strike-breakers.—From copies of correspondence with Mr. J. M. Hogge, M.P., President of the Discharged and Demobilised Soldiers' and Sailors' Federation, which have been forwarded to us by Mr. W. J. Webb, London District Secretary of the Electrical Trades Union, we learn that there is no truth in the assertion that the members of the Federation are to be allowed to act as strike-breakers.

The Purchase of Fraser & Chalmers, Ltd.—The General Electric Co., Ltd., have completed the purchase of the Erith Works and of the goodwill of the manufacturing business hitherto carried on by Messrs. Fraser & Chalmers, Ltd. Practically the whole of the *personnel* have transferred their services to the G.E.C., who will carry on the business as a going concern and under the title of Fraser & Chalmers Engineering Works—proprietors, the General Electric Co., Ltd.

Batti-Wallah Luncheon.—Mr. C. H. Wordingham, Director of Electrical Engineering, Admiralty, will be the guest of the Batti-Wallah Society at their next luncheon, on Monday, October 21st.

Appointments Vacant.—Shift engineer for the Barnsley Corporation electricity works; charge engineer for the Royal Engineers' Camp, Ripon; engineer in charge (£3 + 12½ per cent.), fitter-driver (35s. + 25s. + 12½ per cent.), wireman, linesman, and wireman linesman's mate (40s. and 25s. + 12½ per cent.) respectively for the R.E. Camp, Crowborough; telegraph storekeeper (£200) for the Post and Telegraph Department of the East African Protectorate; shift engineers (77s. 6d.) for the Eccles Corporation electricity works; shift engineer (65s. + 12½ per cent.) for the Radcliffe U.D.C. electricity department; shift engineer (74s. 6d.) for the Warrington Corporation electricity department. See our advertisement pages to-day.

Educational.—The Board of Education's Regulations for Technical Schools, &c., in England and Wales have been issued (Cd. 9,152, price 2d.), and include provisions for the increase of grants to meet the increased rates of fees paid to teachers, the increase being retrospective for the year 1917-18.

Institution and Lecture Notes.—Institution of Electrical Engineers.—The first meeting of the session of the Western Centre was held at Bristol on Monday evening last. Prof. David Robertson, in the unavoidable absence of Mr. R. Howard Fletcher (the retiring chairman), presided over a fair attendance, and inducted Mr. H. I. Rogers to the chair.

Mr. Rogers prefaced his inaugural address by a short allusion to electric welding, and gave many interesting details. The address dealt mainly with the post-war conditions of the electrical industry from the manufacturer's point of view, and made a strong plea for standardisation, both in regard to the producer and the ultimate purchaser. He deprecated Government control of the industry, but welcomed its co-operation. A more efficient method of training apprentices was advocated, and he instanced what had been done in this direction by the Bristol engineering manufacturers with the Local Education Committee. The Institution should renew its endeavours to obtain the much-talked-of Royal Charter, in order that the status of the electrical engineer might be elevated to that enjoyed by the legal and medical professions. Intensity of output was another feature to be aimed at, and this could only be obtained by the manufacturer having at his command a cheap supply of power; the conclusions of the Coal Conservation Sub-Committee in this respect were worthy of the closest and most careful consideration. At the close of the address the chairman invited a discussion on the ways and means of extending their area and incidentally increasing their membership. Mr. C. T. Allan (joint hon. sec.) furnished some details comparable with other centres, and suggested that the western area should embrace Pembrokeshire, Cardiganshire, Brecknockshire, Radnorshire, Carmarthenshire, Herefordshire, and the towns of Gloucester and Cheltenham. Mr. A. C. A. Atchison advocated developing the social side of their meetings, and agreed with the suggestion contained in the chairman's address as to the formation of engineers' clubs. Mr. W. A. Chamen stated that, owing to the war, they had confined their meetings to Bristol and Cardiff, but it was the intention to hold their meetings at a variety of centres in the area when national conditions returned to normal. Mr. G. N. Langdon remarked that the holding of meetings at different centres would attract men who lived in the immediate vicinity of those centres.

Birmingham Electric Club.—On Saturday night Mr. H. F. Steventon read a paper on "Some Modern Applications of the Gyroscope."

Institution of Mechanical Engineers.—On October 4th, the Thomas Hawksley Lecture was delivered by Dr. W. C. Unwin, who dealt with the experimental study of the mechanical properties of materials. At the meeting to-day three papers on hardness tests will be read and discussed, the authors being Prof. C. A. Edwards and Mr. F. W. Willis, Mr. R. G. C. Batson, and Dr. Unwin. Later in the session a paper is to be read on "Electric Welding."

Belfast Association of Engineers.—Last night Mr. W. Walker delivered his presidential address. The following items are included in the programme for the session :—

November 21st.—"Ljungstrom Steam Turbine and Generator," by T. H. Hurst.
January 16th, 1919.—"Electric Welding," by K. Edwards.
February 6th, 1919.—"Ship Riveting," by A. J. Lewis.

Illuminating Engineering Society, U.S.A.—The annual Convention was to be held in the Engineering Societies' Building, New York City, on October 10th. The entire technical programme was confined to one day, instead of four days, as was the custom before the war. The evening of October 10th was given over to a dinner-meeting, at which speakers of national prominence discussed questions pertaining to the war and illumination.

The Proper Use of Coal.—Lecturing on this subject, at the Dewsbury Central Liberal Club, last Saturday, Mr. W. B. Woodhouse, general manager and engineer of the Yorkshire Electric Power Co., spoke of the inefficiency of the steam engine in regard to economy of fuel, not more than 25 per cent. of the heat value being utilised in power production. He said the gas engine was rather more efficient under steady load conditions, but was less efficient when the load varied. Though hopes were entertained of the possibility of a gas turbine, or some means of using some of the heat which both gas and steam engines wasted, efficiency in the meantime called for the production of power by large steam turbines generating electricity for distribution over wide areas. There was difference of opinion in regard to the recommendations of the Board of Trade Committee that a new body should take over all electricity generating stations, though no doubt generation at large stations would effect a big saving. Several municipalities in the West Riding considered that the work should be done in conjunction with neighbours, and working arrangements had already been made between Sheffield, Bradford, Rotherham, and the Yorkshire Power Co. The Reconstruction Committee had quoted the saving of 78 per cent. on the North-East Coast, and if a similar saving was made throughout the country, there would be a gain of 45,000,000 tons of coal per year in the factories alone. There was much waste of power at the mines, and there was a possibility of saving 40,000,000 to 60,000,000 tons of coal a year in the mines and factories by using electric power economically produced. Referring to the expected future economy in steel-making by the combination of coke ovens, blast furnaces, steel furnaces, and rolling mills with large plants, and a concentration of such works in suitable centres, the lecturer said electric power would, of course, be used, and if steel works capable of a yearly production of 300,000 tons were established, the use of motors of 15,000 H.P. each would be involved. As to domestic uses, he said there was such a loss of heat in producing gas and electricity that, despite its poor efficiency, the open coal fire was the cheapest method by which fuel could be consumed to-day, except that a coal fire had to burn itself out, whereas electricity and gas could be turned off at will. A carbonised solid fuel, produced by methods giving the best yield of by-products, would probably be the cheapest for general house heating, gas and electricity being used for cooking and occasional heating.

Institution of Post Office Electrical Engineers.—On Monday last the 1918-19 session of the South Wales Centre opened with a lantern lecture upon "Telephony Fundamentals," given by Mr. A. L. Stanton, A.M.I.E.E., at the South Wales Engineers' Institute, Cardiff. Mr. McIlroy, Superintending Engineer for South Wales, occupied the chair, and a discussion, opened by Mr. J. H. M. Wakefield, followed.

Inquiry.—Makers of the "Aldis" electric lamp, used in hospitals, are asked for.

Theft of Copper.—At Loughborough Petty Sessions, on 9th inst., Alfred Williams, electrical engineer, of Fulham, was sentenced to three months' imprisonment, with hard labour, and William Whittaker, erector, Romford, and Frank Turley, fitter, Birmingham, were fined £10 each, including costs, for stealing 296 lb. of copper, value £14 16s., the property of the Loughborough Corporation, on July 25th. It was explained that for some months past extensive alterations had been in progress at the electrical station, the defendants being employed by the contractors.

Salt in Leclanché Cells.—A correspondent who recently had occasion to write to the Ministry of Munitions of War, Explosives Department, for a licence to purchase salammoniac, received a reply, from which we extract the following paragraph :—

"I recommend that you should make good the deficiency in your requirements by the substitution of a corresponding proportion of common salt in your battery charges. It is found that up to 40 per cent. of this material can be substituted without serious effect on the life of the batteries."

We should be interested to learn whether any of our readers have had any experience in this connection.

Measures for the Conservation of Metals.—The attention of scale and weighing-machine manufacturers is drawn to the concession which has been granted to the trade by the Priority Department of the Ministry of Munitions for the supply of metals required by the whole trade of the United Kingdom of manufacturers and repairers of scales and weighing machines for industrial purposes for home trade. The metals may be used for repairs and maintenance of weighing apparatus of all capacities, but, for new machines to replace those beyond repair, only those which do not exceed a capacity of 5½ cwt., or a total weight (material) of 4¾ cwt., can be supplied. Under this new rationing scheme no new weighing instrument may be manufactured, supplied, or sold having a capacity of more than 5½ cwt., total weight 4¾ cwt., or exceeding the following values :—56-lb. capacity, maximum value £20; 5½-cwt. capacity, maximum value £50; without a special permit granted by the Priority Department of the Ministry of Munitions. Messrs. Price, Waterhouse & Co., chartered accountants, of 3, Frederick Place, Old Jewry, E.C. 2, have been appointed the Rationing Authority, and will deal with applications for the release of material, and apportion to each manufacturer the quantities allocated to him. In the event of manufacturers requiring material during the three months commencing November 1st next, it will be necessary for them to complete a schedule and declaration of information required by the Priority Department, and forward them to Messrs. Price, Waterhouse & Co. The Ministry of Munitions wishes to impress upon all manufacturers the absolute necessity of limiting, as far as possible, the estimates of their requirements. In the first place, the conservation of metals is a matter of the greatest national importance, and, in the second, a strict economy on the part of manufacturers will have considerable influence in their favour on the issue of further permits. Full particulars, with the schedule, &c., can be obtained from the Secretary to the National Advisory Committee, 97, Cannon Street, London, E.C. 4.

Kaiserism in England.—A correspondent sends us the following letter which, he says, was picked up in a railway train, having apparently been dropped by someone unknown :—

"Potsdam.

"My Dear Brother,—While reading the Electrical Review, I came upon your magnificent letter. Impossible for any man to work without your permission! Superb! I had not thought that in your traitorous country was one of such spirit. My heart warms to you, and when my shining armour has been polished up and my mailed fist repaired, I have decided to transfer my glorious powers to the ennobling of your land. I have written it and shall indeed do it. I will be your Commander and you shall be my Chief of Staff. None shall breathe without our permission.

"I kiss you on both cheeks. "Wilhelm."

Unlighted Tramcar.—At Halifax, on Friday last, Norman Brook, Corporation driver, was fined 10s., including costs, for having his car unlighted in Godley Road, at 8.45 p.m., on September 25th. He had lost the trolley wheel, and did not possess a hand lamp. He should have had two lamps, but stated there was a shortage. When the trolley came off, it got fast in the overhead guard wires, which were brought down, and it was necessary to cut the current off a section to avoid accidents. Defendant was some distance from the nearest houses, and could not leave the car to try and borrow candles or lamps. It was agreed by the Bench that the Tramways Committee should not be exonerated from blame, but the case must be dealt with in the ordinary way.

Electric Vehicle Progress.—The railways are going ahead in their adoption of the electric vehicle. The latest news is that the Lancashire and Yorkshire Co. has put into service a new five-ton vehicle supplied by the General Vehicle Co. The first five-tonner acquired by the company has been in constant use for the last two and a-half years. The new vehicle is arranged to take a detachable platform or skip upon which the goods are loaded, the skip being placed on or removed from the chassis by means of special lifting tackle. While the vehicle is taking one loaded skip out for delivery, another skip is being loaded up ready to place on the vehicle when it returns, the maximum amount of work being thus obtained from the vehicle.

The following municipalities have either decided to obtain electric vehicles or have actually placed orders:—Kettering, a wagon (£1,200) for the borough surveyor's department; Southampton, an additional wagon for the tramway department; Bolton, a vehicle for the electricity supply department; Leyton, two tip wagons; Swansea, two tip wagons; Chester, a tip wagon at £1,439; South Shields, a tip wagon; Aberdeen, a five-ton tip wagon at £1,600; Worthing, four tip wagons; Inverness, two tip wagons at £1,229 each; Cardiff, the city engineer advises the Corporation to adopt electric vehicles for refuse collection; Mansfield, the Corporation has recently put into service for refuse collection a two-ton tipping wagon supplied by the General Vehicle Co.

A borough surveyor, in recommending his Council to adopt electric vehicles, estimates that their employment will reduce the cost of collecting refuse by 1s. per ton after payment of wages, repairs, interest and sinking fund, electrical energy, and all other charges. The Adelaide Corporation, N.S.W., has in use an electric sweeper which is fitted with an Ironclad-Exide battery of 48 cells. During the year ended September 30th, 1917, this machine covered 2,730 miles, the units of electricity used per mile averaging 2·08, and the total cost of operation, excluding wages, 5·4d. per mile.

Operating Costs.—One firm in the United States—the Ward Bakery Co.—employs no fewer than 600 electric vehicles in bread delivery. That such vehicles are extremely economical in power cost is shown by the following record of a 750-lb. electric van used in ordinary city delivery service, furnished by the Electric Vehicle Section of the National Electric Light Association of America—

Days in use	30
Miles covered	1,140½
Average load carried	1,000 lb.
Number of miles run on 1 unit of electricity	3·57
Average miles run per day	38·01
Average units of electricity consumed per day	10·65
Power cost per mile at 1½d. per unit ...	0·42d.

—*Electric Vehicle.*

The Kettering U.D.C. electricity department put into service in the early part of last summer a 3½-ton tipping wagon supplied by the General Vehicle Co. It is employed for the cartage of coal and clinkers, and we gather from the *Electric Vehicle* that the results attending the first nine months' use have been very satisfactory. The saving in cost over the previously-employed system of horse-haulage works out at the rate of £146 per annum. The vehicle has fully lived up to the reputation of electrics for reliability; during the whole nine months it has not been out of commission a single day. The tipping body made by Messrs. Ruston, Proctor & Co., of Lincoln, is hand-operated, and a full load can be emptied in two minutes. We quote the following figures:—

Total mileage covered...	3,500
Total coal and clinker carted, tons	6,494
Cost of electrical energy used, 5,840 units at 1d. ...	£24
Drivers' and other wages, maintenance, licences, insurance	£238
Interest and sinking fund	£155
Average total cost per ton carted	1s. 3d.
" units per vehicle-mile	1·67
" " " ton carted	0·9

Wireless on German Aeroplanes.—The Halberstadt two-seater biplane, according to the *Engineer*, is wired internally to increase its capacity for wireless. Accommodation for the aerial and its spool is provided in the observer's cockpit. The dynamo also provides energy for heating the pilot's and observer's clothing. It is driven direct from a pulley on the engine, and is carried on a bracket fixed to the left-hand engine bearer. The dynamo when fitted—it is not fitted unless actually required—projects outside the fuselage, and is enclosed in a bulbous stream-line fairing. The bracket carrying the dynamo is hinged at its upper edge, and is provided with a clamping device at its lower edge; by this means the tension of the driving belt can be adjusted.

The Decimal Association.—The Royal Commission on Decimal Coinage, of which Mr. T. McKenna, chairman of the Executive Committee of the Decimal Association, is a member, held a preliminary sitting on October 16th.

Fatalities.—John Barratt (59), labourer, of Hove Edge, near Halifax, was killed instantaneously last week, on accidentally touching an electric switch at the chemical works where he was employed.

A stoker named Woodman, employed at the Great Western and Metropolitan Dairies, Weston, Staffs., died, on Wednesday last week, from injuries received from a blow from an electric fan which kept the chamber cool. The supposition was that he was struck whilst looking through the gap in the wall in which the fan was running. The Government Inspector said the fan was reasonably safe, but, in view of the accident, he would require it to be further protected. A verdict of "Accidental death" was returned.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Central Station Officials.—Swindon T.C. has fixed the salary of the acting electrical engineer, Mr. F. Newey, at £275 a year.

The salary of Mr. A. B. Slater, manager of the Burton-on-Trent tramways, has been increased by £50 per annum and war bonus.

Mr. W. P. Hooper, charge engineer, Dewsbury Corporation electricity Works, has resigned, having obtained a post under the Rawtenstall Corporation.

Mr. R. H. Wilkinson, tramways manager to the Huddersfield Corporation, has been appointed tramways manager of Bradford, in succession to Mr. C. J. Spencer, who joins the London Underground system. Mr. Wilkinson is 44 years of age, and has been in charge of the Huddersfield undertaking for 14 years, previous to which he was manager for four years at Oldham. The commencing salary is £800 a year.

Mr. W. B. Smith, chief assistant of the Greenock Corporation electricity department, has been appointed manager of Paisley Corporation electricity department. There were 150 applicants. The salary is £600. Mr. Smith entered the service of the Greenock Corporation in 1907, and became chief assistant engineer four years ago. He has been lecturer and demonstrator in electrical engineering in Greenock Technical School evening classes for 12 years.

Rotherham E.C. recommends the Establishment Committee to increase the salaries of the technical staff at the Power station (Messrs. Lilleker, Redmayne, Rodgers, and Jessop) to £400 per annum.

Mr. J. C. Connell, who has been for ten years on the staff of the Blackburn Corporation electricity department, has been appointed charge engineer at the Accrington electricity works.

The Loughborough Corporation has advanced the salary of Mr. R. B. Leach, the borough electrical engineer and manager, by £50 per annum. Mr. Leach has also been appointed Fuel Overseer of the borough.

Mr. A. E. Pott, M.Inst.C.E., M.I.E.E., has resigned the managership of the Metropolitan Electric and London United Tramways, Ltd., in order to take up a position under the Tramways (Board of Trade) Committee. The two tramway companies have, however, retained Mr. Pott's services in a consultative capacity. Mr. C. J. Spencer, at present manager of the Bradford Corporation Tramways, has been appointed to fill the vacancy created by Mr. Pott's resignation.

General.—Mr. Thomas McLeod has purchased the controlling interest in the Power Plant Co. We are informed that the management is now entirely British. The new managing director is Mr. R. J. McLeod, and the assistant general manager Mr. W. H. Sykes, the technical staff remaining as before.

Roll of Honour.—Mr. H. G. Burnett, who was in civil life a draughtsman in the Rugby works of the B.T.H. Co., has been killed in action.

Private L. Walmsley, Liverpool Regt., who has died of wounds, was prior to the war on the electrical engineering staff at the Neepsend power station, Sheffield.

Second Lieutenant A. V. Bradshaw, Royal Berks Regt., who has been awarded the Military Cross for gaining a position over a stream and maintaining it, was on the Grantham staff of the Urban Electric Supply Co.

The Military Medal has been awarded to Sergeant F. Critchley, R.E., who enlisted in September, 1914, from the electrical engineering staff of Siemens Bros., Stafford.

Private J. G. Nelson, Lincolnshire Regt., recently reported missing, now stated to be a prisoner of war in Germany, was employed by Messrs. Dick, Kerr & Co., Preston.

Private A. Goderidge, formerly on the staff at Siemens Bros. Dynamo Works, Stafford, has fallen in action.

Second-Lieutenant G. M. Barnett, 39, West Riding Regt., killed in action, was, prior to the war, chief cashier of the Huddersfield tramways department.

Private I. Creighton, West Yorkshire Regt., killed in action, was employed by Messrs. Dixon & Sons, electricians, Leeds.

Lance-Corporal B. Nadin, Northumberland Fusiliers, who has been killed in action, was employed in the engineer's office of the electrical department, Midland Coal, Coke, and Iron Co., Apedale.

Corporal W. F. Dale, Grenadier Guards, an employé on the Birmingham electric tramways, has been awarded the Croix de Guerre for bravery in a gas attack.

Private C. Price, Lancashire Fusiliers, wounded, was formerly employed by Messrs. Ferranti, Ltd., Hollinwood.

C.Q.M.S. H. Stanway, Loyal North Lancashire Regt., who has died from wounds received in action, was employed by Messrs. W. T. Glover & Co., Ltd., Trafford Park.

According to the *Times*, Major L. P. Aizlewood, M.C., R.A.F., who was accidentally killed while flying over the sea on September 29th, studied mechanical and electrical engineering at Sheffield University and Parkgate Iron and Steel Works. He had received the Military Cross in 1916 for engaging five enemy aeroplanes, one of which he brought down. Subsequently he was wounded in France, and after

that did valuable work at home in establishing and conducting aerodromes and in training men for the R.A.F.

Gunner H. Tilley, previously employed in the controller's department at the British Thomson-Houston Works, has been killed in action.

Obituary.—Mr. T. R. Taltavall.—We regret to record the death of our confrère, Mr. Thomas R. Taltavall, editor of the *Telegraph and Telephone Age* since 1911, and formerly associate editor of the *Electrical World*. He began life as a telegraphist, in which capacity he excelled; while the pages of the *Age* under his direction have always been full of interest and information. Mr. Taltavall was a native of North Shields, and was 63 years old when he died. He went to America at the age of 12 years, and rose from the post of messenger in the Atlantic & Pacific Telegraph Co.'s service to the position of superintendent of telegraphs of the Associated Press. In 1890 he became editor of the *Electrical Age*, and from 1894 to 1911 he was associate editor of the *Electrical World*. He made improvements in the typewriter, invented a useful quadruplex repeater, and was well known as an author.

Mr. J. K. Symonds.—The death occurred on October 3rd, at the age of 66 years, of Mr. J. K. Symonds, a director of the Braunton (Devon) Electric Light & Power Co., Ltd.

Mr. Thomas Preece.—Mr. T. Preece, electrical and mechanical engineer, and the local agent of the Westinghouse Co., Manchester, and the Westinghouse Brake Co., London, died very suddenly on Saturday last at Bradford, at the age of 57 years. Formerly his firm was known as Andrews and Preece, but latterly he practised under his own name only.

Mr. Henry Howgrave-Graham.—Mr. H. Howgrave-Graham (a cousin of Mr. W. J. Tennant) passed away at St. Leonards on October 10th, at the age of 80 years. He was articled as an engineer, and subsequently acted as resident engineer for certain public works. After holding several responsible secretarial positions he was, in the early eighties of last century, appointed secretary of the Institute of Patent Agents (which office he held for nearly 36 years, missing during that period only two or three meetings). Under the Patents Act of 1888 he was also appointed Registrar of Patent Agents.

Wills.—The late Mr. J. Allen Baker, M.P., chairman of Joseph Baker & Sons, Ltd., for many years a member of the L.C.C. and interested in its tramway matters, left £22,411.

NEW COMPANIES REGISTERED.

Aabada Dry Batteries, Ltd. (151,596).—Private company. Registered October 5th. Capital, £3,000 in £1 shares. To enter into an agreement with George Nikolayevitch Autonoff for a licence to use a certain invention relating to improvements in dry cells in electrical batteries, &c. The subscribers (each with one share) are:—W. Blount, 80, Gracechurch Street, E.C. 3, insurance broker; W. J. Chivers, 24, Byton Road, Mitcham, S.W. 17, clerk. C. W. Grimwade signs as a director. Registered office: 61, St. James's Street, S.W. 1.

Metrodes, Ltd. (151,642).—Private company. Registered October 10th. Capital, £5,000 in £1 shares. To carry on the business of electrical and mechanical engineers, founders, smelters, smiths, manufacturers of chemicals, steel manufacturers, general merchants and agents, metallurgists, contractors for coal, coke, iron or ironwork, steel, bricks, tiles, &c. The subscribers (each with 50 shares) are:—W. Christie, 105, St. Vincent Street, Glasgow, manufacturing agent; J. Henderson, 6, East Parade, Sheffield, chartered accountant. The first directors are not named. Registered office: Town Hall Chambers, 67, Fargate, Sheffield.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Mann, Egerton & Co., Ltd.—Mortgage dated September 18th, 1918, charged on freehold premises at Ipswich, to secure £4,500. Holders: F. P. Bugg, A. J. Leighton, and F. E. Leighton, Ipswich.

E. G. S. Co., Ltd.—Particulars of £6,000 debentures, created September 18th, 1918, filed, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

Weaverham Electricity Supply Co., Ltd.—A notice of the appointment of H. L. Dale, of 133, Chester Road, Northwich, as receiver on October 3rd, 1918, under powers contained in trust deed dated 1916, filed pursuant to Section 94 of the Companies (Consolidation) Act, 1908.

Watford Electric & Manufacturing Co., Ltd.—Mortgage deed, dated October 2nd, 1918, to secure £5,400 and further advances charged on freehold hereditaments and premises at Whippendell Road, and Sydney Road, Watford. Holder: R. A. Lister & Co., Ltd., Dursley, Glos.

CITY NOTES.

Victoria Falls and Transvaal Power Co., Ltd.

The Marquess of Winchester, addressing the annual meeting on October 11th, said that the further improvement of over £36,000 in revenue, under circumstances which increased the cost of everything, was a source of great satisfaction. After going through the financial details in the accounts and referring to a law court case bearing upon the question of relief of colonial income-tax, he said that the position of the low-grade mines had been a source of anxiety. The one commodity which was of first-rate importance to the gold mining industry was the price of power, and that, having been fixed by statute, remained the same. Gold mining and the supply of power to the mines were the two industries in which profiteering was impossible. The only way in which they could meet wage and stores advances was by economy of production. They could not maintain regularity of supply if they failed in maintaining their plant at the highest point of efficiency. Skimping their upkeep would not assist them; therefore the only way was to study economy of production. After referring to the employés who had rendered service with the Forces, the speaker mentioned that in conjunction with the Johannesburg Juvenile Advisory Committee the management in South Africa had submitted a scheme to give technical instruction to a certain number of young men who had lost the years between 18 and 23 in fighting, and who had therefore passed the usual age of apprenticeship, to enter themselves on their return, and the scheme embraced the payment of a sufficient wage to enable the individual to be independent of family assistance. The period of indenture would be for four years on a rising scale of remuneration. Their chief engineer, Mr. Bernard Price, had been appointed chairman of the committee appointed by the Union Government for the scientific and technical encouragement of the development of South African industries and resources. The appointment would not interfere with his duties to the company, whilst his presence on the committee might eventuate to the company's benefit. The general working of the stations had been maintained at the highest point of efficiency in spite of the difficulty in obtaining spare parts. No additions had been made to the generating plant. Rains had been plentiful, and the water supplies were ample. The monthly returns of profit promised a report as satisfactory as that now before them, but those results could not be indefinitely improved upon unless the demand for power increased. The chairman expressed sympathy with the head engineer in the electrical branch (Mr. Bryden) on the loss of his wife and child through the dastardly sinking of the *Galway Castle* by the enemy.

Eastern Extension, Australasia, and China Telegraph Co., Ltd.

The report for 1917 states that the revenue was £1,508,440, while the ordinary expenses were £351,261, and £220,886 was expended upon maintenance of cables, maintenance ships' reserve fund, payments to staff, and other war expenses, &c., leaving £956,294. After providing £427,057 for income-tax and excess profits duty payable in England, and £30,096 for debenture interest, £499,141 remains, plus £63,121 brought forward. £250,000 has been placed to general reserve fund. The total distribution for the year was 8 per cent., free of tax, leaving £72,261 to carry forward. The cost of the diversion and partial renewal of the New Zealand cables (£28,280) has been debited to general reserve, together with £25,000 as a further provision on account of investment fluctuations, and £6,546 representing the loss on sale of investments during the year. The concession granted to the company by the Spanish Government in 1897 for providing and maintaining under a subsidy arrangement cable communication between Manila and the Islands of Hoilo and Cebu (Visayas), having expired in November last, the company's stations in those islands have been closed, and the cables picked up for utilisation elsewhere. Their estimated value will be credited to the general reserve fund this year.

Barcelona Traction, Light & Power Co.—The committee representing the holders of the 7 per cent. prior lien "B" bonds, the 5 per cent. first mortgage 50-year bonds, and the 5 per cent. ten-year notes of the Barcelona Traction, Light and Power Co. have drawn up a plan, of which the approval of the bondholders is asked, which, while involving further sacrifice on the part of the latter, will, the committee believes, place the company upon a solid financial foundation.—*Financial Times.*

West African Telegraph Co., Ltd.—Revenue for 1917, £59,041, less £18,020 ordinary expenses and £31,181 expended upon maintenance of cables, differences in exchange, income-tax, pension fund, &c., leaving £9,840. Total distribution for the year 4 per cent., free of tax, carrying forward £50.

Electric Supply Corporation, Ltd.—For the past year £2,668 is put to repairs and renewals, £2,500 to reserve, 10 per cent., less tax, dividend is paid, and £393 carried forward.

Oriental Telephone & Electric Co., Ltd.—Interim dividend of 3 per cent. on the 6 per cent. cumulative preference shares for the current year, less income-tax, and one of 4 per cent. on the ordinary shares, free of income-tax.

National Telewriter Co., Ltd.—For the year ended June 30th there was a loss of £206, against £240 for the previous year.

Indo-European Telegraph Co., Ltd.—Interim dividend for the June half-year at the rate of 5 per cent. per annum, free of income tax.

Anglo-American Telegraph Co., Ltd.—Interim dividend for September quarter 10s. per cent. on the ordinary stock, less tax.

United River Plate Telephone Co., Ltd.—Interim dividend 3 per cent. (3s. per share) on the ordinary share capital, free of income-tax, for the half-year.

Lima Light, Power & Tramways Co.—Dividend 1½ per cent.

Shanghai Electric Construction Co., Ltd.—Interim dividend at the rate of 5 per cent. actual, less tax.

STOCKS AND SHARES.

Tuesday Evening.

Markets throughout the Stock Exchange show notable strength. The German appeal for an armistice is regarded more in the nature of an admission that the enemy knows the game is up, than a step which is likely to lead to immediate peace. At any rate, it is a step, and one in the right direction. Markets are by no means unduly elated. There is intense satisfaction, but no indication of the mafficking spirit. President Wilson's reply is held to be admirable. Satisfactory progress with the War Bonds campaign has had little effect in denuding markets of money for investment. One of the features this week is a further rise in the prices of cable securities.

Peace prospects are having a marked influence upon electric lighting shares—upon all illumination issues as a matter of fact, for gas stocks have been advancing sharply, and instances have come under our notice of investors who have been buying both gas and electric light shares during the past few days, on the assumption that the companies will do well after the war. The principal change in the home electricity list is a rise of 10s. in City of London ordinary to 12½, closely followed by another 7s. 6d. in Westminsters, while St. James are 5s. up, and Charing Cross ordinary 2s. 6d. Besides these actual changes, the tone of the market is very different from what it was a month ago, and now it is just as difficult to get the offer of shares at reasonable figures as it was then to get an offer for them at prices satisfactory to the holder. Dividends are less of a factor to-day than are the prospects of business after the war, although, of course, the electricity companies afford good returns on the current quotations, as reference to our lists will show, although it must be repeated that there is a chance of the next batch of dividends suffering reduction.

Allotment letters of the new ordinary shares of the Newcastle-on-Tyne Electric Co. are out this week, and the price is 9d. to 1s. 6d. premium on the issue price of 20s. 6d.

The cable market is sustained by a batch of excellent reports which have appeared within the past few days. The Eastern Extension is a good example. The company earned £50,000 short of a million pounds net, an advance of £165,000 over the previous year's figures. As, however, the income-tax and excess profits duty took £180,000 more than in the previous twelvemonth, the actual result is to leave things much as they were, in spite of an increase in the gross receipts of £208,000. Appropriations are again treated on a liberal scale, and the reserve receives £250,000, making it £1,680,000, of which nearly 70 per cent. is invested in War Bonds. The price of the shares has risen to 16 ex dividend. Eastern Telegraph ordinary has recovered a point in addition to the 30s. deducted for the dividend last week. Westerns have gone up 12s. 6d. allowing for the dividend, and Cuba Submarine ordinary at 10½ ex 5s. are the same price as they were last week cum dividend. Anglo-American preferred has at last risen to par. Globes hold their improvement, and the only shares in the market to show a decline are West India and Panama ordinary, which slipped back to 36s. 3d.

Marconis have come to the fore again, recovering to 4⅛. There seems to be some little doubt in the minds of investors as to whether Marconi shares fall into the "peace" or the "war" category, and after falling to 4 7/16 on peace prospects, the same reason was used as a lever for rallying the price as already mentioned. Marconi Marines at 3¼ and American Marconis at 32s. 6d. are both above the lowest levels recently reached, but it is not at all surprising that sellers should have come in, considering the somewhat breathless advance that has taken place since the beginning of September.

Mexicans have been again forging ahead materially. Mexico Tramway 5 per cent. Bonds, which stood at 50 at the beginning of the month, are now 60, and gains ranging from 1 to 3½ points have been secured by most of the issues in utility companies with which we deal. Monterey debentures has gained 2 at 47½. There is no stock about, and, as indicated here when prices were very much lower than they are now, quite a little demand sufficed to bring about a radical change in the market, and to lift prices by leaps and bounds. Brazilian Tractions have again been rising, showing a gain of 2 points at 58, supporters of the company claiming that it should not be long before a dividend on the common shares comes into sight. The last payment made to holders of these was in January, 1917. Anglo-Argentine Tramways are good, the 5 per cent. debenture advancing 3 to 74, and the second preference at £3 being ¼ up. British Columbia issues are unchanged, save for a gain of 1 in the deferred. Kalgoorlie Electrics at 1s. 6d. have trebled in price.

The manufacturing group holds its own with firmness, though here, again, the market has made some rough attempt to divide the stocks and shares into peace and war categories. Because of this, British Westinghouse Preference are ¼ down at 2½, and Babcock & Wilcox have eased off to 3½. India-Rubber shares, on the other hand, are 5s. up at 17½. Telegraph Constructions have risen to 49, in sympathy with the strength of cable shares. Callender's gave way another 5s. by reason of the impending new issue, while the preference at 5½ are the fraction higher in consequence of the proposed raising of the dividend. Some are asking whether Henleys will follow suit in regard to the preference shares, the dividend on which is 4½ per cent., allowing a yield, at £4 per share, of 5½ per cent. on the money. Edison-Swans stand out with a rise of 1s. 3d. to 17s. 6d., brisk business taking place in the shares. Victoria Falls preference strengthened to 25s., and the ordinary are holding the improvement which they secured upon account of the recent report. The second debentures changed hands pretty frequently on the basis of 106½.

Rubber shares have recovered further, and are now a less disappointing market. The suggestion that the Ministry of Munitions should fix a maximum price for the produce is a perplexing factor in the situation. Armament shares are inclined to give way. Railway stocks are steady. Underground Incomes rose a point, the market being short of stock. London and Suburban Tractions are dull, the ordinary at 3s. 3d., and the preference at 8s. 3d. Indian Electric debentures at 90 are 5 points higher.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1917.	Price Oct. 15, 1918.	Rise or fall.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	9	10	6⅝	—	£7 17 0
Charing Cross Ordinary	5	4	2⅜	+ ⅛	6 3 0
do. do. do. 4½ Pref.	4½	4½	3⅝	—	6 18 6
Chelsea	3	5	3 5/16	—	7 16 10
City of London	8	8	12½	+ ½	6 10 7
do. do. 6 per cent. Pref.	6	6	10	—	6 0 0
County of London	7	7	10	—	7 0 0
do. do. 6 per cent. Pref.	6	6	9⅜	—	6 3 1
Kensington Ordinary	6	7	5¼	—	6 17 7
London Electric	Nil	Nil	1⅜	—	Nil
do. do. 6 per cent. Pref.	4	5	3⅜	—	7 2 10
Metropolitan	3	4	3 1/16	—	6 10 7
do. 4½ per cent. Pref.	4½	4½	3½	—	6 18 6
St. James' and Pall Mall	8	9	6¾	+ ¼	6 13 4
South London	5	5	3	—	6 13 4
South Metropolitan Pref.	7	7	20/6	—	6 16 7
Westminster Ordinary	7	9	6½	+ ⅜	6 18 6
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref.	6	6	100	+ ½	6 0 0
do. Def.	1½	1½	23½	—	6 9 0
Chile Telephone	8	8	7½	—	5 6 8
Cuba Sub. Ord.	7	7	10½xd	+ ½	*6 13 4
Eastern Extension	8	8	16xd	+ ¼	*5 0 0
Eastern Tel. Ord.	8	8	16½	+2½	*4 19 1
Globe Tel. and T. Ord.	7	7	14½	—	*4 16 5
do. do. Pref.	6	6	10½	—	5 17 1
Great Northern Tel.	24	22	35	—	6 5 8
Indo-European	13	13	58½	+1	5 12 0
Marconi	15	20	4⅛	+ ⅛	4 6 6
Oriental Telephone Ord.	10	10	3⅜xd	+ 1/16	2 19 4
United R. Plate Tel.	8	8	7⅞	—	*5 3 3
West India and Panama	6d.	1/3	1⅛	— 1/16	*3 8 8
Western Telegraph	8	8	17½xd	+ ⅛	*4 13 5
Home Rails.					
Central London Ord. Assented	4	4	62½	—	6 8 0
Metropolitan		1	26	—	3 17 0
do. District	Nil	Nil	25	—	Nil
Underground Electric Ordinary	Nil	Nil	2⅞	—	Nil
do. do. "A"	Nil	Nil	7/6	—3d.	Nil
do. do. Income	6	4	87	+1½	*4 12 0
Foreign Trams, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	97	—	6 6 4
Anglo-Arg. Trams. First Pref.	5½	5½	93	—	—
do. do. 2nd Pref.	5½	—	8	+ ½	—
do. do. 5 Deb.	5	5	74	+3	6 15 2
Brazil Tractions	—	—	58	+2	—
Bombay Electric Pref.	6	6	102	—	5 11 7
British Columbia Elec. Rly. Pfce.	5	5	59½	—	8 8 0
do. do. Preferred	Nil	Nil	41½	—	Nil
do. do. Deferred	Nil	Nil	38½	+1	Nil
do. do. Deb.	4½	4½	59½	—	7 2 10
Mexico Trams 5 per cent. Bonds	Nil	Nil	60	+5	Nil
do. 6 per cent. Bonds	Nil	Nil	45	+1	Nil
Mexican Light Common	Nil	Nil	34½	+2½	Nil
do. Pref.	Nil	Nil	48	+3½	Nil
do. 1st Bonds	Nil	Nil	67	+1	—
Manufacturing Companies.					
Babcock & Wilcox	15	15	38	— ½	4 2 8
British Aluminium Ord.	10	10	15	—	5 6 8
British Insulated Ord.	20	20	23	—	4 4 2
British Westinghouse Pref.	7½	7½	23	— ¼	6 0 0
Callenders	20	25	10½	— ½	6 2 9
do. 5 Pref.	5	5	5¼	+ ⅛	—
Castner-Kellner	29	20	31	—	5 8 4
Edison-Swan, "A"	—	—	8	+ 1/16	Nil
do. do. 4 per cent. Deb.	4	4	78	—	5 6 0
Electric Construction	7½	10	14	—	7 5 6
Gen. Elec. Pref.	6	6	109	—	6 2 4
do. Ord.	10	10	18½	— ½	*5 8 1
Henley	25	25	24	—	5 11 2
do. 4½ Pref.	4½	4½	4	—	5 12 6
India-Rubber	10	10	17½	+ ½	*5 14 3
Telegraph Con.	20	20	49	+ ½	*4 18 0

*Dividends paid free of Income Tax.

BUSINESS CONDITIONS AFTER THE WAR.

We print below from the *Yorkshire Observer* an account of a speech delivered by Mr. Stanley Baldwin, M.P., Parliamentary Secretary to the Treasury, at the autumn congress of the Textile Institute last week. We do so because we regard it as important that such a warning should receive whatever publicity we can give it when so many minds seem to be intent on spending millions of money on all sorts of schemes of amelioration in times when the nation will require to watch its expenditure very conservatively.

Mr. Baldwin said there was nothing of greater importance to the country than the way in which the English business world was going to face what might lie before it at the conclusion of peace. First of all, he would ask them to consider the main feature of the financial position of this country as we saw it after four years of war. He thought one thing stood out before all others, and that was the immense creation of credits with the enormous purchasing power appertaining to them and the consequent rise in prices which had gone on in this country beyond anything that could have been anticipated. We had seen bank deposits very nearly doubled during the last four years. We had seen also—what we had never expected to see—a practically unlimited issue of currency. He did not mean unlimited in any wild-cat manner; but only without limit so far as the creation of credits might be without limit. They must all recognise that these processes must come to an end.

It was quite impossible for anyone to indulge in prophecy as to what would happen after the war in the domain of trade and finance, and for this reason, that so many of the factors that must enter into the equation were, and must remain, unknown. There was an idea in men's minds, founded on their experiences of the past, that the period immediately succeeding a great war—as had happened in Europe after the Franco-Prussion war—must be a time of booming trade. Many men would in consequence have their speculative instincts aroused. There would be an enormous amount of short-dated bills—he meant Treasury bills—to be redeemed, and these would mean a vast amount of fresh purchasing power. A great amount of fresh credit could be opened by the employment of them, and he looked upon their existence as one of the danger points, for those who were the holders of them might seek immediately to employ their funds in speculative rather than in sound business transactions.

One more very fruitful source of expenditure that might become very dangerous was rash and ill-considered expenditure on large schemes of social amelioration, the argument being put forward—as it was on some platforms—that if the country could afford to spend seven millions a day on war it could afford to spend a great deal on improving the condition of the country. He did not wish to say anything on any schemes that might be proposed, but only to remind them—what many who used the argument did not know—that it was not possible to go on much longer, it would not be wise to go on a day longer raising money for any purpose in the way in which we had been raising it.

Owing to the German submarine, we had not been able to export gold. When the danger of the submarine was gone, however, then the danger would become immediately present to us of any movement in the exchanges which would deplete this country of its gold resources to a greater extent than it had already suffered. They had got to remember as business men that a great deal of the apparent prosperity of the business world of to-day was built on a foundation of sand, and was more of the nature of a house of cards than a house of stone. Their object should be to convert it into a house of stone on a foundation of rock.

To his mind the great danger to-day, the great danger of a period of inflation, lay in the political situation. Inflation was not a subject that was understood by the masses of the people, nor was it a subject that could easily be discussed on a popular platform, and when the inevitable panics ensued, which must and would ensue, with all the countries of the world suffering from inflation in different degrees, they must remember that they had to deal with a world where the power had passed into the hands of an enormous number of new voters to whom the whole subject would be incomprehensible. He believed there would be no surer road to ruin than for a country of this kind to pass from a well-ordered constitutional Government into a condition akin to that of revolution. There would be no surer road to ruin than a period of prolonged inflation, enormously high prices, with the consequent wage disturbances that must ensue, and the inevitable panic that would come at the end of it. In his view, then, it was of the very greatest importance that at the earliest possible moment the borrowings of the Government beyond what might be found to be absolutely necessary should be stopped. As a necessary corollary to that the Government should try to live within its income. Then it should begin to make provision, on however small a scale that might be possible, for the repayment of the debt.

As we emerged from the period of the creation of bank credits to which we had become so accustomed, we had got to realise that the only sound foundation for the creation of capital was the way in which our forefathers created it, and that was by saving. It was not popular to talk about saving, but he was immensely impressed by the necessity for it. We had got to check the export of gold, we had got to import nothing that was not absolutely necessary, and we had got to stimulate to the utmost extent our export trade. Then, treading the parts of sound finance, we wanted to reduce, as we were able, the amount of currency notes, and help to check inflation in that way. Above all, business men must produce, and produce as far as possible only useful articles, and not waste money and energy and ingenuity in speculative trades. In useful trades he would say produce, produce, and produce everything they could.

With regard to the adjustment of wages, Mr. Baldwin said that to-day there was a very pronounced movement in favour of securing a living wage rate, and putting the price of the article on the top of that. They all knew the difficulty of that in international trade, but he believed the movement in favour of it would not be confined to this country, and they might find it possible in the business of the future to help the working classes to progress on those lines in a way that had hitherto been impossible in international trade.

As to the future, Mr. Baldwin declared that the great thing would be the spirit of the people. He thought we had got to realise that there were ugly things that had got to be rooted out. We had seen a great deal of the spirit of self-sacrifice and the spirit of heroism during the war. At the same time there was a spirit of selfishness and greed that boded no good. The word profiteering which was given to it was an ugly word which had a reality behind it. Now he felt very strongly that one of these spirits—that of self-sacrifice or that of profiteering—was going to be the master of the whole of our future. Our future depended upon which gained the upper hand. If the spirit of profiteering gained the upper hand after the war, then we should head for an inevitable disaster financially, and build up no civilisation that was worth having. But if we followed the other path, and if we put our whole endeavour into the task of conducting the businesses of this country on sound and honest lines, if we threw our whole might into that, and determined on so doing our duty as to elevate with us so far as we were able and in a spirit of self-sacrifice the classes that were brought into contact with us, we need have no fear for the future, and we should know that the civilisation that we should build up after the war would be one built upon a rock, and one that would last.

EXTENSIONS AT LEEDS.

The official opening of the new works at Whitehall Road of the City of Leeds electricity department was performed by the Lord Mayor of Leeds (Mr. Frank Gott) on Friday, October 11th.

The new works consist of the first instalment of buildings designed ultimately to contain some 42,000 kw. of generating machinery, and comprise three main blocks, namely, boiler house, pump house, and engine room and switchgear house.

Of the boiler house the extension now opened consists of half the ultimate building, and eight water-tube boilers, each capable of evaporating 30,000 to 35,000 lb. of water per hour, with all accessories, can be housed in it. It consists of three stories, the basement being devoted to the handling of the ashes, the ground floor accommodating the actual boiler plant, and the first floor the economisers and coal bunkers. In the basement are situated the hoppers into which the ashes from each boiler are discharged. These ashes are passed through electrically operated crushers into pipes and conveyed by air current into a large bunker situated outside the building, and fixed at such a height that it can be readily emptied into motor wagons, tramway trucks or canal barges without the ashes being handled by hand. The heating surface of the boilers, which were manufactured by Messrs. Babcock & Wilcox, Ltd., is 7,719 sq. ft., with superheaters of 1,815 sq. ft., and chain grate stokers of 182 sq. ft. area, capable of burning 4,000 lb. of coal per hour.

Each boiler is provided with its own economiser, and every pair of boilers discharge gases into a single chimney through a large induced draught fan which is driven by a three-phase motor. The manufacturers of the economisers are Messrs. E. Green & Sons, Wakefield, the induced draught fans, Messrs. Hattersley Pickard & Co., Leeds, and the motors, the Hinchcliffe Green Manufacturing Co., Leeds.

The coal bunkers situated above the boiler house have a capacity of approximately 1,250 tons, and the coal handling plant was manufactured by Messrs. Babcock & Wilcox. The coal is brought to the works by barges or motor wagons, and is efficiently discharged by mechanical appliances into bunkers situated on the wharf adjoining the works. From these bunkers it is conveyed by a gravity bucket conveyor up the end of the boiler house and over the coal bunkers and discharged at any desired point. The capacity of the single conveyor is 40 tons per hour. The bunkers themselves communicate with the hoppers fixed over the automatic stokers by long steel shutes, so that the coal passes direct from the barges to the fire grate without being handled.

For convenience of access and repair a 2-ton Waywood lift is provided, communicating with all floors in the boiler house.

The pump house is one-third constructed, and contains one unit of the machinery ultimately to be installed. This unit consists of a high-speed triple-expansion engine manufactured by Messrs. Belliss & Morcom, and directly coupled to a centrifugal pump manufactured by Messrs. Rees Roturbo Co., Wolverhampton. This pump is designed to discharge 3½ million gallons of water per hour against a head of 35 ft., and is specially fitted up internally for dealing with water from the River Aire. The engine exhausts directly into a condensing plant manufactured by Messrs. Isaac Storey, Ltd., Manchester.

To enable repairs to be promptly carried out a 15-ton overhead electrically operated travelling crane is provided.

The main engine room is a lofty building provided with an electrically operated travelling crane manufactured by Messrs. Isles, Ltd., Stanningley, capable of lifting 60 tons. It contains at the present time two generating sets, one 6,000-kw. turbo-alternator manufactured by the British Thomson-Houston Co., Ltd., Rugby, exhausting into a jet condensing plant manufactured by Messrs. Cole, Marchent & Morley, of Bradford, the auxiliary plant being supplied by Messrs. Rees Roturbo Co., Wolverhampton; and one 12,000-kw. turbo-alternator supplied by Messrs. Siemens Bros. Dynamo Works, Ltd., Stafford, exhausting into a surface condensing plant manufactured by Messrs. Mirrlees Watson Co., Ltd., Glasgow. Both the main sets run at a speed of 1,500 r.p.m., and generate three-phase alternating current at a pressure of 6,600 volts. They are each provided with the necessary instruments and measuring appliances to permit of their economical operation being at all times carefully checked. In the basement of the engine room are situated the large water pipes necessary to convey the condensing water, various hot-well tanks and also a large capacity motor-driven boiler-feed pump which automatically provides the supply of water for the boilers. A duplicate of this pump is provided in the auxiliary plant for the 12,000-kw. machine, and in that case the pump, together with other machinery to which it is connected, is driven by a 200-h.p. steam turbine manufactured by the British Thomson-Houston Co.

The switch-house consists of six floors; the lowest floor forms the pipe basement referred to above; the next floor contains stores for sub-station equipment and also accommodates the main generator cables. The third floor accommodates incoming feeder cables, reactance gear and bus-bar transformer gear; the fourth floor the main switches, works sub-station, and machine rheostats; the fifth floor contains the control board for operating the switches, main bus-bars, battery room and motor generating plant; and the top floor forms the meter store and testing department.

In addition convenient rooms are provided for accommodating the staff. To provide adequate safety for the attendants operating the switchgear, this is of the remotely controlled solenoid-operated type, no high-pressure current being in contact with any portion of the operating board, and the main switches are designed to break loads considerably in excess of the capacity of the generating plant to be ultimately installed. The switchgear was manufactured by the British Westinghouse Electric & Manufacturing Co., Ltd., Manchester. The generating plant and outgoing feeders are all protected with devices to automatically operate when faults occur on the system, and the regularity of pressure is maintained by apparatus manufactured by Messrs. Cox-Walker, Darlington.

The contractors for the buildings were Messrs. William Airey & Sons, Leeds, the architect being Mr. G. W. Atkinson, Leeds, and the engineering details were designed and arranged by Mr. C. Nelson Hefford, the Corporation electrical engineer.

The new works are electrically connected with the older ones through a large sub-station containing 12,000 kw. of Scott connected two-to-three-phase transformers, so that the works always operate in parallel, either being able to make up any deficiency experienced by the other.

Further extensions in both old and new works are now being carried out, and when the present extension is completed the contents of the two works will be:—

Old Works.—Two 3,000-kw. sets; two 6,000-kw. sets; two 7,500-kw. sets.

New Works.—One 6,000-kw. set; one 12,000-kw. set.

Total for both works: 51,000 kw., including spare machinery.

The second half of the new boiler house is to be completed, and a further section added to the pump house and switch house. It is further anticipated that a second 12,000-kw. set will be ordered and installed in the new works as soon as the Ministry of Munitions is prepared to issue the required sanction, and the subsequent installation of a third set of similar capacity will complete the new works and make the capacity of the combined stations 75,000 kw.

The chairman of the Corporation Electricity Committee (Councillor Hugh Lupton) expressed the gratification of the committee at meeting such a large attendance of visitors at the works. As one might learn from one's enemies, so one might learn from one's friends, and the new engine house owed something of its inspiration to the large engine houses which had been visited on the Rhine, and also owed a good deal to the large engine house visited in Paris. The committee had no prejudice in favour of any particular type of turbine, but chose what it considered the best to meet the needs of the time. In going through the boiler house the visitors would notice that the coal was handled entirely automatically, from the moment it came alongside the wharf to the time the ash was discharged by the shoots into carts for carrying away. It was never touched by hand at all. The ash cellar in the new house was, he considered, the last word in perfection. This was a matter of great satisfaction because it contributed not only to greater efficiency of working, but also to the better health and comfort of the men. He considered they had approached very nearly the limit of possibility in the way of economy with steam plant. When he considered the growth of the Leeds station during the past ten years, and the cost of generating a unit of electricity in that station, he could not think that any reconstruction of the kind proposed by Government Committees could be of the slightest advantage to Leeds. But it might be said that they must not be selfish; there were smaller areas which would benefit by such a change. That was granted, but he would suggest that the larger towns, in conjunction with the Yorkshire E.P. Co., which already covered the greater part of that area, should unite their forces and help each other and any of the smaller districts which required cheap power.

The Lord Mayor, in declaring the works open, said it was a pleasure to congratulate the committee on what it had been able to carry through during a period of great difficulty. He urged that where it could be shown that a city had a well-arranged and progressive station, such as that at Leeds, which had never cost the ratepayers a penny, and had made profits in relief of rates, the Government should hesitate before transferring the undertaking to some other body which might not understand the needs of the citizens as their own electrical representatives would do. He would suggest that in a district such as that, where the larger cities and the Yorkshire E.P. Co. practically covered the ground, surely some mutual arrangement could be arrived at, which, whilst not including smaller urban districts, should safeguard the city's own interests and authority. One did not object to the five national commissioners proposed by the Williamson Committee, who merely took the place of the Board of Trade, but he maintained that the Corporation ought to be allowed to retain complete ownership of the municipal generation and supply, with obligations to smaller places at proper rates, and there would be no difficulty in arranging mutually satisfactory terms. It would be impossible to show that such a proposal as the Commissioners contemplated could generate and deliver energy in Leeds more cheaply than the Corporation could ever deliver.

Mr. Alec Campbell, on behalf of a group of works, said the demand of those factories had come suddenly on the electrical undertaking, but they had never been let down for power. The consumption for the past year had been over nine million units, and it was expected to be materially greater during the coming year. The demands they had made on the department had been readily met in the past, and he did not doubt they would be equally well met in the future.

Mr. C. Nelson Hefford, the electrical engineer, thanked the speakers for the kind things which had been said of his working colleagues, his staff, and himself. It was gratifying to know that their labours had met with success, and to feel that their work was appreciated. He also took the opportunity to thank the chairman and the committee for the consideration and care with which they had looked into many suggestions which he had, from time to time, had to put before them. On many occasions they had given him valuable guidance. He thanked those firms whose support in the early days had helped to build up the present extensive undertaking.

The Lord Mayor then started the 6,000-kw. set, and the visitors afterwards inspected the whole plant and buildings.

OUR TRADE WITH CANADA.

His Majesty's Trade Commissioner's Office at Montreal has issued a report on the trade of Canada and Newfoundland for the year 1917, and this has been printed recently by the Department of Overseas Trade (Cd. 9,159, price 3d.). It can be obtained from His Majesty's Stationery Office, or through the usual agents.

It will be of interest to electrical manufacturers and allied traders in this country, not so much perhaps from the point of view of immediate openings for the sale of their goods, as with a view to keeping in touch with manufacturing developments in Canada and with such opportunities for the sale of non-competitive goods as may arise after the war.

American Competition.—The most important fact bearing upon the economic situation of Canada during the year 1917 was the entry of the United States into the war. Before that event, it seemed as though the United Kingdom, engrossed in manufacturing supplies of war for her own needs and for her Allies, would be compelled gradually to withdraw from the export trade to Canada. Naturally, in such case, Canada, both on account of proximity to the United States, and of the ever-increasing means of communication between the two countries, would seek to obtain from the neighbouring republic that part of her requirements previously obtained

from the United Kingdom, with which the latter was not in a position to supply her.

The entry of the United States into the war in April, 1917, changed the situation, but, while the pressure has thus been relieved to some extent, the United Kingdom manufacturers have not been in a position to resume their former activities and to supply the demands from overseas.

United Kingdom manufacturers, when the war ceases, and labour is once more available for peaceful purposes, should have no fear that they will not be able to regain the businesses they have been compelled to relinquish during the war, provided they maintain their system of supplying goods above reproach at reasonable prices.

Canada's Appreciation of the United Kingdom Market.—The value to Canada of the United Kingdom market has probably been appreciated more widely and more fully in the Dominion since the war commenced than at any time previously.

This has been strongly impressed in many ways upon the citizens of Ontario and Canada generally. For example, the national advertising campaign undertaken in connection with the flotation of the Victory War Loan in November and December last, persistently emphasised the fact that the United Kingdom had always been Canada's best customer, is so now, and will be in the future. This cannot have other than a beneficial effect upon United Kingdom trade with Canada. The point is being impressed upon the people at large who ultimately make up the purchasing power of the country, and many of whom may have overlooked the fact that the United Kingdom is Canada's best market.

While the United States remained neutral, it was able to supply Canada with many lines previously purchased from the United Kingdom.

United Kingdom trade with Canada naturally suffered as a result of war conditions which prevented the exportation of certain goods to the Dominion. The trade of the United States with Canada benefited to some extent because of that fact. This position was somewhat changed in 1917, as it has become increasingly difficult for Canada to obtain various goods from the United States. In short, many of the disadvantages which the United Kingdom shouldered in regard to trade with Canada, because of war, are now shared by the United States. This, perhaps, may be considered an advantage to British trade in relation to the return of normal trade conditions.

Sentiment in favour of the United Kingdom is still strong in Ontario, and augurs well for British trade after the war. The advertising there of many varieties of United Kingdom goods, with emphasis upon the patriotism of buying goods made in the United Kingdom or in the British Empire, has had a good general effect, in addition to the results attained by individual firms. The desirability of United Kingdom firms not allowing the Canadian market to forget their brands, even in war time, when deliveries are difficult or impossible, cannot be too strongly emphasised.

The competition of the United States in Canada is likely to be just as vigorous, if not more so, after the war as before it.

How to Obtain Trade in the Dominion.—In the course of gathering information for this report, merchants in the various lines of trade were asked how, in their opinion, the British manufacturer could secure a greater portion of the trade offering. The answer, in almost every instance, was that British manufacturers and exporters should have representatives calling on the trade, and, where their lines permitted, showing samples, and—more important—studying the requirements of the local market.

One large firm, whose buyers cover the European and American markets several times a year, made the following remarks: "British manufacturers have not to any great degree investigated New Brunswick or Canadian requirements or conditions. They have been indifferent to the designs and styles demanded by our people. They have been slow to adopt suggestions touching improvements. . . . The neglect of these vital things has hindered the development of British trade in Canada, and compelled us to buy largely in the United States market."

"Remedies suggested would be that the manufacturers send representatives who are progressive and possess initiative, and who would collect samples of shapes and patterns suitable for the Canadian trade, and take them to their principals, who should take some action instead of shelving the samples, and declining to produce the goods because they are something different from what they have been making. The Japanese commenced collecting samples in the autumn of 1914; the result is that large shipments made from these samples have been coming into Canada during 1916-17, and are giving satisfaction, being copied from the medium-class goods, hitherto supplied by Germany and Austria."

The buying capacity of the Maritime Provinces is arpidly increasing, and local merchants have no hesitation in saying that they will give the British manufacturers the preference of their trade if they will take advantage of their opportunity.

Increased Dominion Production.—As an indication of the competition which United Kingdom manufacturers have to face as against local industries, it may be noted that the census of manufactures taken in Canada during 1915 showed that as regards iron and steel products 851 establishments were in existence with a capital approaching 196 million dollars, using materials of aggregate cost of 59 million dollars, and with a total value of production amounting nearly to 120½ million dollars. There were 1,173 establishments producing metals and metal products other than steel, the value of their output being nearly 91 million dollars. Another noteworthy item refers to vehicles for land transportation, which were being turned out by 464 establishments to the value of nearly 74 million dollars.

AN AMERICAN REVIEW OF FOREIGN ELECTRICAL TRADE PREPARATIONS.

The New York *Electrical World* (September 28th) publishes the following review of the preparations that are being made by various electrical manufacturing nations for after-the-war trade throughout the world:—

Each week brings fresh evidence of the preparation that is being made by every industrial nation to enter the markets of the world in competition for the foreign trade that is expected on the conclusion of the war. Of German plans little information has reached the outside peoples. There has been, however, sufficient proof of Germany's intention to regain as much as possible of the foreign trade that she once held. German capital is finding its way into Scandinavian countries. Only recently a large German electrical corporation was started in Sweden. It was plainly evident that this company would provide a market for certain German goods that when fabricated could enter Russian and other Eastern markets without the stigma of "Made in Germany" attached to them.

In the international trade in electrical merchandise Germany stood number one, with England running second, and the United States third. France and Belgium also shipped considerable quantities of electrical goods to other countries. When war broke out, however, the foreign trade of the world in electrical goods fell off considerably. That of Germany and Belgium fell to nothing, with France not much better. England has only partly regained that which dropped off. For the first three months of the current year the exports of English electrical goods were but slightly more than $3,000,000, which is less than one month's figures for the United States have been for many months.

Exports of electrical goods from the United States have increased by almost 100 per cent. over the 1913 total in value, although the increase in volume is evidently considerably smaller.

The facts are, therefore, that a considerable volume of trade remains unsatisfied. For this trade and for those markets that have arisen as a result of the war's devastation manufacturers are beginning to make active preparations.

England and Japan are unusually active in so far as electrical goods are concerned. In the past four years the output of electrical goods in Japan has increased enormously. To some extent, of course, the Japanese output has been augmented by American electrical factories in Japan. The factories are under American guidance, but use Japanese labour. Large factories are springing up all over Japan, and with efficient production methods and very cheap labour, these goods will be able to reach foreign markets at a price which will be difficult for other countries to meet.

English manufacturers have apparently learned the advantage in foreign trade held by the German cartel. They are now forming groups, studying conditions and laying plans. Particularly is this true of the wire and cable manufacturers. One thing is evident, and that is that the English manufacturers are going to make every effort to monopolise colonial markets. For economic reasons, however, it is doubtful if much headway will be made in the Dominion of Canada.

Italian electrical manufacturers are organising for foreign trade. The latest evidence is the formation of a trade association for this purpose by the wire manufacturers. Sweden and Norway are understood to be making similar preparations.

In the United States electrical manufacturers are very quietly making their plans. Some large corporations have been formed by the larger manufacturers for foreign trade, and agencies are being quickly established in the principal open markets. Smaller manufacturers are making connections with export houses.

Far more significant than the above, however, is the fact that the American electrical manufacturer is at last beginning to realise that goods meant for domestic consumption are not as a rule suited to foreign trade. In the past year a large number of wiring products and other kinds of electrical goods have been developed solely for use in foreign trade. Almost without exception these goods have been designed to meet low-price competition.

The Fixation of Nitrogen in Japan.—According to a Bill passed by the last Diet, the Government of Japan has decided to establish a laboratory for the study of the fixation of atmospheric nitrogen. The demand for ammonia for fertiliser amounts to nearly 20,000,000 yen each year, and up to now this has been supplied solely by importation. It is hoped to make this a local industry in the near future.—*Journal of Electricity.*

NEW BRITISH AND KEY INDUSTRIES EXHIBITION.

On Monday, October 7th, as stated here last week, a new industrial exhibition was opened in the Central Hall, Westminster, just a month after the close of the British Scientific Products Exhibition. The initiative and organisation in this instance are due to the Tariff Reform League.* The name chosen for the exhibition, New British and "Key" Industries Exhibition, is rather ambitious, as indicated by the singling out of tungsten as a key metal, as is done in the handbook.

The exhibition is compact; many firms have large and impressive stands, and atttention is drawn to the pleasing display. Nearly half the 145 exhibitors were represented at the recent exhibition at King's College; in many cases, however, the exhibits are differently arranged or of different kinds. The handbook is conveniently arranged, but does not contain much detailed information besides the general articles on the chief industries. The expense involved in such an undertaking, especially at the present time, is very heavy, and has to be met by voluntary contributions. No charge is made to the public, nor has any charge been made to exhibitors for space. The exhibition will be kept open every day from 11 to 8, till October 24th, when it will be transferred to Manchester and other centres; the hours and date might have been mentioned in the handbook.

Messrs. Hadfield's, Ltd., Hecla and East Hecla Works, Sheffield, have excellently arranged exhibits which face the visitor on entering; most of these will be familiar to visitors from the King's College exhibition. The variety of the alloys of iron with many metals, including tantalum, zirconium, and sodium, of copper, cobalt, aluminium, &c., is very great, and further, a model of the United Engineers' Society building, of New York, 254 ft. high, is shown, to which Sir Robert Hadfield has frequently referred in discussions on the organisation of scientific bodies and publications.

Sir W. G. Armstrong, Whitworth & Co., Ltd., exhibit samples of materials used in manufacture of high-speed tool steels, special alloy steels, &c. The millionth-measuring machine, produced by Sir Joseph Whitworth in 1855, is also on view. This machine will show a difference of one-millionth part of an inch; it works with a gravity piece, which drops when one of the centres is slightly receded.

Messrs. Firth & Sons, Ltd., Norfolk Works, Sheffield, show samples of bullet-proof manganese steel and of non-magnetic manganese steels; further, tungsten (18 per cent.) steel, and magnetos (in conjunction with the British L. M. Ericsson & Manufacturing Co., Ltd., Beeston, Notts.), illustrating the use of ferro-tungsten magnet steel; nickel and nickel alloys, including the Firth-Brearley stainless knife steels.

Messrs. Vickers, Ltd., Vickers House, Westminster, S.W., utilise their central stand for demonstrating the testing of their magnetos under actual test conditions. Magnetos with a 6-mm. gap for six- and eight-cylinder engines are sparking continuously, and an engine, run for demonstration at 2,000 revolutions, sends a rapid succession of sparks up a slightly diverging spark gap of 10 mm., arranged like a lightning arrester of the horn type. The various other exhibits of the firm are similar to those shown at King's College, and will be remembered by visitors.

The British Aluminium Co., Ltd., 109, Queen Victoria Street, E.C. 4.—Aluminium is well represented by this company, which exhibits the ores, intermediaries, and by-products. Ingot, sheet, rod, bar, sections, tube, wire, powder, &c., are exhibited, as are also alloys containing aluminium. Articles illustrating the use of aluminium in aeronautical, automobile, electrical, and other industries are on view, together with articles showing the domestic uses of aluminium.

We were interested in noticing among these exhibits a small aluminium commutator, field coils wound with aluminium wire, and an aluminium trolley head.

(To be concluded.)

NEW PATENTS APPLIED FOR, 1918.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. Sefton-Jones, O'Dell and Stephens (successors to W. P. Thompson & Co., of London), Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

15,836. "Reactance coils." J. R. Beard & Electrical Improvements, Ltd. September 30th.

15,853. "Selective devices for wireless telegraph receiving-apparatus." W. M. Mather. September 30th.

15,868. "Electric incandescent lamps." British Thomson-Houston Co. (General Electric Co.). September 30th.

15,869. "Electrical welding-apparatus." British Thomson-Houston Co. (General Electric Co.). September 30th.

15,945. "Manufacture of incandescent electric lamps." British Thomson-Houston Co. (General Electric Co.). October 1st.

15,953. "Dynamo-electric machines." W. A. Price. October 1st.

15,957. "Driving-mechanism for ignition apparatus of internal-combustion engines." H. H. Saddington. October 1st.

16,035. "Electric clocks, &c." W. Youlten. October 2nd.

16,044. "Receiving and repeating systems for telegraphy." J. S. Withers (K. C. Cox). October 2nd.

16,046. "Methods for detecting variable electric currents in the sea." F. B. Young. October 2nd.

16,054/5. "Electric switches." J. A. Crabtree & J. B. Tucker. October 3rd.

16,136. "Electric vacuous bulb-thermonic devices." J. Erskine-Murray. October 4th.

16,137. "Detection of conducting-bodies submerged in electrolyte." A. G. Ionides, W. Jevons & F. B. Young. October 4th.

16,138. "Wireless-signalling systems." British Thomson-Houston Co. (General Electric Co.). October 4th.

16,142. "Electro-plating and electro-cleaning apparatus. A. Ness. October 4th.

16,179. "Electric heat-regulating switches." A. A. Buck. October 5th (Switzerland, March 11th.)

16,193. "Torsion dynamometers." H. Bolas & Parnall & Sons. October 5th.

16,203. "Protective devices for alternating current electric systems." A. E. McColl. October 5th.

16,217. "Electrical operation of recording, &c., instruments." L. Williams. October 5th.

* Elec. Rev., October 11th, 1918.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1917.

10,163. Call distributing systems for telephone exchanges. Western Electric Co. & L. Polinkowsky. July 13th, 1917. (118,864.)

12,857. Electrical resistances. F. A. Ross. September 7th, 1917. (118,878.)

12,959. Dynamo-electric machines. Hon. Sir C. A. Parsons & A. H. Law. September 10th, 1917. (118,880.)

13,139. Brush and terminal contact mechanism of dynamo-electric machines. J. Stone & Co. & A. H. Darker. September 13th, 1917. (118,886.)

13,192. Automatic telephone sub-station mechanism. A. E. Stevens. September 14th, 1917. (118,889.)

13,541. Telephone exchange systems. Western Electric Co. September 22nd, 1916. (109,815.)

13,559. Current motors. A. L. Munn. September 20th, 1917. (118,899.)

13,681. Detective and protective devices for electric cables. C. J. Beaver, A. F. W. Richards & E. A. Claremont. September 22nd, 1917. (118,902.)

15,210. Electrically-heated soldering iron. E. Caretta. October 19th, 1917. (118,928.)

15,232. Change-speed gears. O. von Zweigbergk. October 19th, 1917. (118,929.)

17,095. Alloys. British Thomson-Houston Co. (General Electric Co.). November 20th, 1917. (118,947.)

17,377. Electric storage batteries. R. L. Smith. May 17th, 1917. (116,256.)

18,860. Rotary field magnets. Aktiebolaget Ljungstroms Angturbin. December 19th, 1916. (112,441.)

1918.

3,166. Electrical relays. E. Fawssett & H. Parry. February 21st, 1918. (118,984.)

3,418. High-voltage distributors for electric-ignition apparatus. Akt.-Ges. Brown, Boveri et Cie. March 14th, 1917. (114,825.)

4,000. Internal-combustion engines having electric ignition. R. W. Maudslay & Standard Motor Co. March 7th, 1918. (118,801.)

4,613. Apparatus for therapeutic treatment by means of electric and other forms of radiant energy. W. J. Smyth. March 15th, 1918. (118,992.)

4,640. Electric motor controllers. Igranic Electric Co. (Cutler-Hammer Manufacturing Co.). March 15th, 1918. (118,994.)

4,749. Signalling-apparatus for automatic telephone system. A. E. Stevens. September 14th, 1917. (Divided Application on 13,191/17.) (118,805.)

6,466. Electricity meters. Landis & Gyr Akt.-Ges. April 19th, 1917. (115,627.)

7,667. Electrolytical production of zinc. G. H. Clevenger. May 7th, 1917. (115,847.)

7,750. Governing means for fluid-pressure turbines. Brush Electrical Engineering Co. (Aktiebolaget Ljungstroms Angturbian.) May 8th, 1918. (118,821.)

9,074. Means for controlling electric circuits. British Thomson-Houston Co. (General Electric Co.). June 1st, 1918. (119,016.)

9,082. Interlocking plug switches for electric circuits. H. Stokes. June 1st, 1918. (119,017.)

9,285. Manufacture of carbon electrodes. B. E. D. Kilburn (Norske Aktieselskab for Elektrokemisk Industri, Norsk Industri-Hypotekbank). January 9th, 1918. (Divided application on 551/18.) (119,018.)

10,306. Electric signalling systems, more particularly for use in mines. Automatic Telephone Manufacturing Co., and Remington Co. February 22nd, 1918. (Divided application on 12,199/17.) (118,828.)

Electroscope Cautions.—When a delicate gold-leaf electroscope is used, considerable care should be taken to prevent damage to the gold leaves. Only a very small charge must be given to such an instrument. If it is desired to experiment with larger charges, make up a rough electroscope with Dutch-metal leaves, which are not nearly so easily damaged, and far more readily repaired. It is necessary to keep the cap of the instrument free from dust, but care should be exercised in dusting. Too vigorous application of the silk may excite the cap sufficiently to drive the leaves too far apart, and strain them at the point where they are attached. The electroscope should be put right away in a cupboard when an influence machine is to be used. A correspondent states that he once spent several hours making a particularly delicate electroscope and then absent-mindedly left it on the table about six feet from a Wimshurst machine, with the result that the leaves were torn off by the induced charge, and driven to opposite sides of the glass case.